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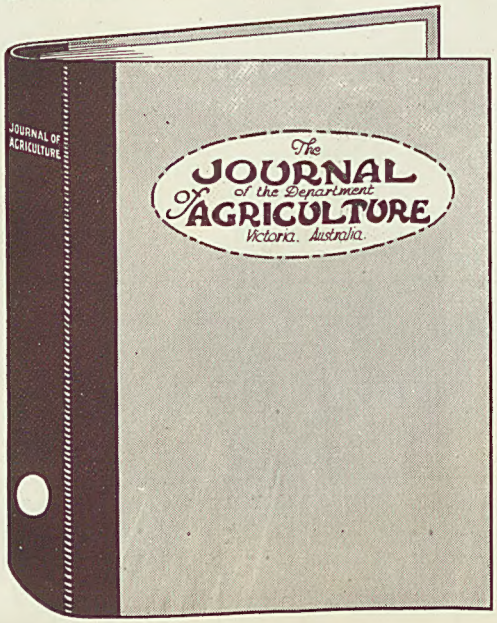

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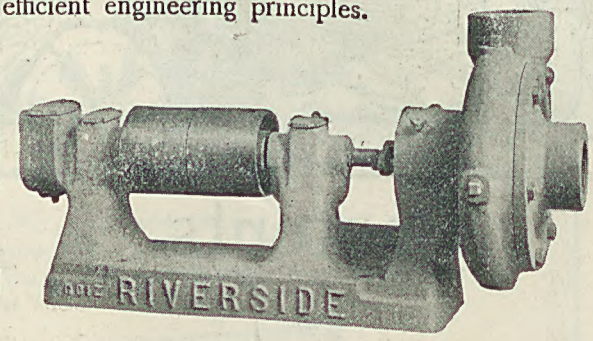

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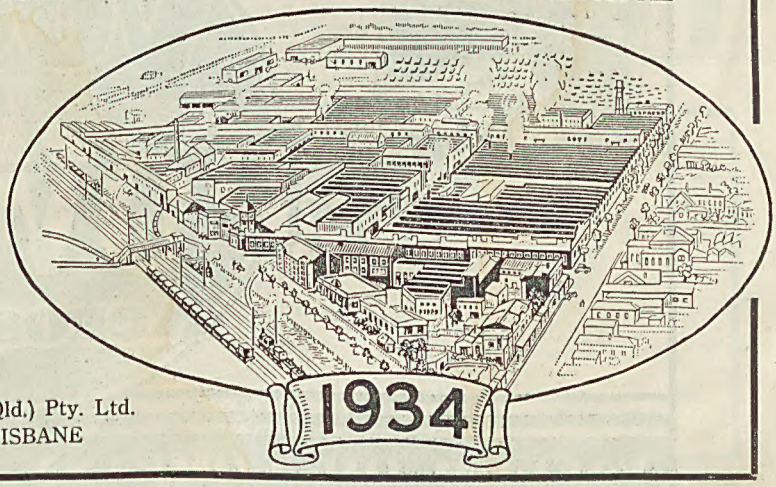

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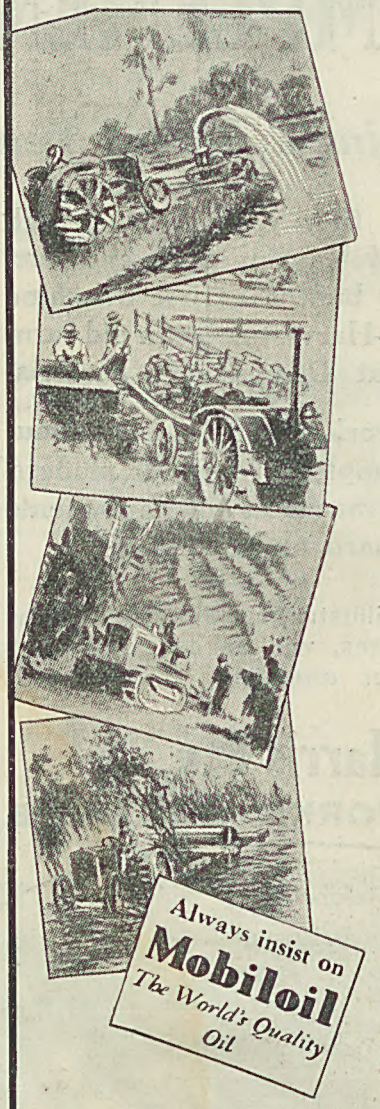

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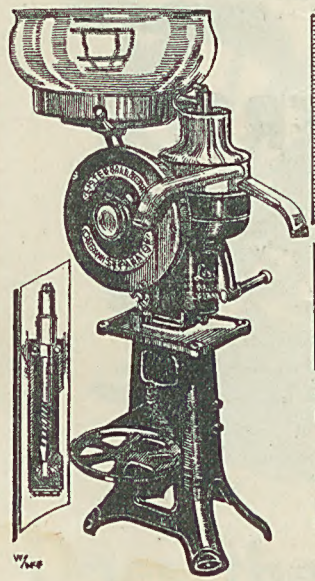

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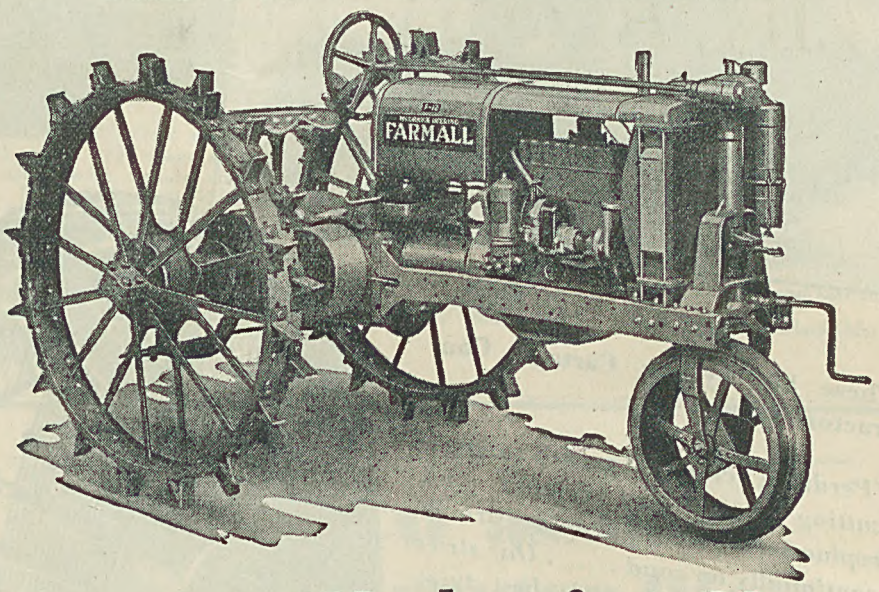

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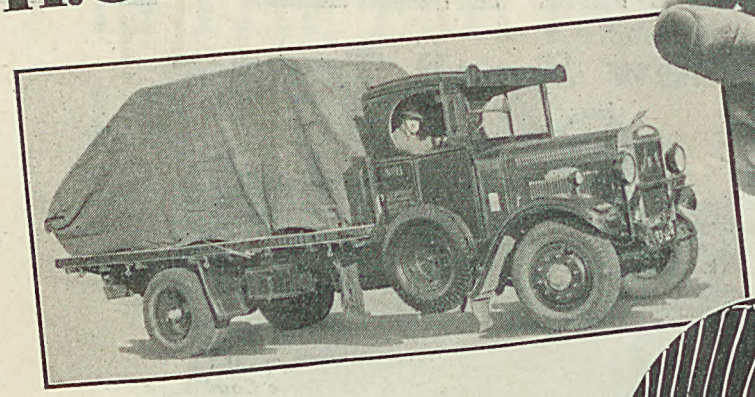

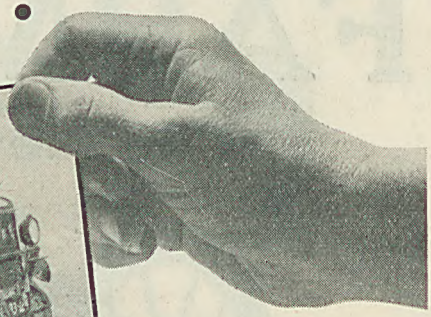

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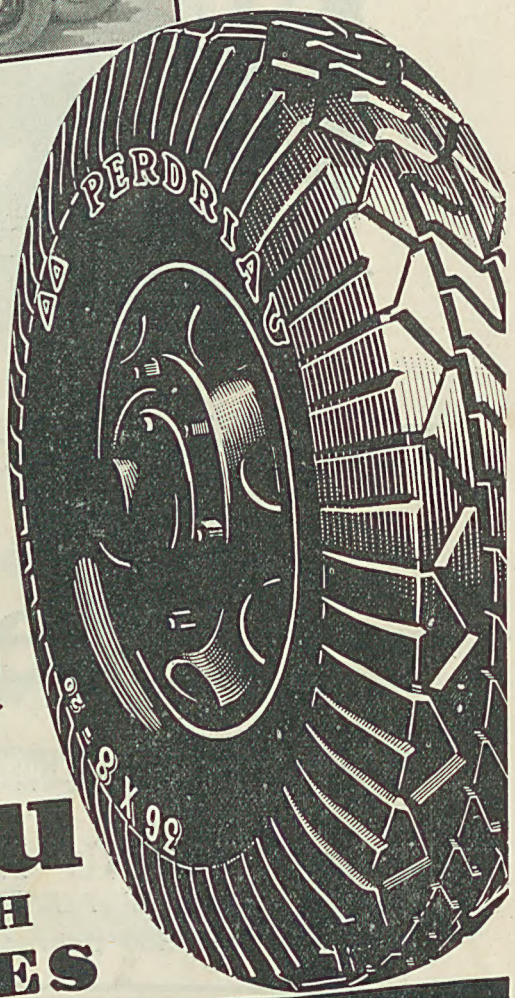

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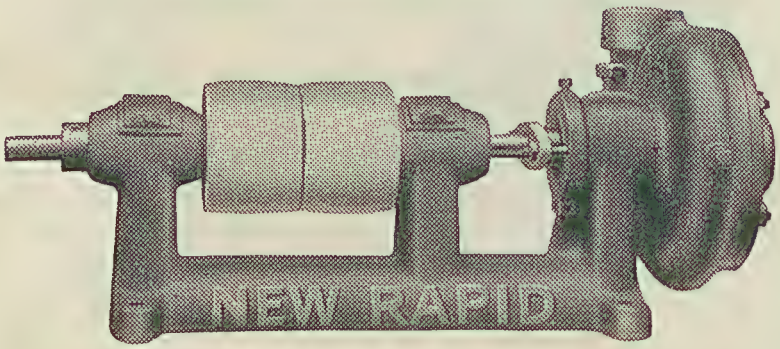

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The Journal of the DEPARTMENT of AGRICULTURE of VICTORIA

Hoary Cress Control

By A. Morgan, B.Agr.Sc., Weeds Research Officer

THE feasibility of eradicating hoary cress or "white-weed" (*Lepidium Draba* L.) depends mainly upon the economics of the particular case. Where the infestation is widespread, the expense of eradication is so great that no land-owner, particularly at the present time, would consider embarking on such a programme. The best that can be done under such circumstances is being done by many wheat-growers, who realize the importance of thorough cultivation to suppress the weed to a sufficient extent to allow the crop to get away before competition from the weed-growth becomes detrimental to the vigour of the crop as a whole. Although such methods result in pieces of root being distributed to parts as yet uninfested, and the whole area ultimately becoming heavily infested, it is a case of choosing the lesser of two evils.

In the case of the small patch or patches in an otherwise clean area, the situation is different since, in comparison with the value of the total area, the cost of eradicating the few small patches is not excessive, and may be regarded as an insurance against ultimate widespread infestation.

Methods of Control.

There are available five methods of control, each of which has particular value under certain conditions, which will be outlined briefly. The methods are—

(*a*) persistent regular cultivation,
(*b*) salting,
(*c*) carbon bisulphide,
(*d*) chemical herbicides, particularly arsenicals, applied as sprays, and
(*e*) plant competition.

Cultivation.

In experiments at the State Research Farm, Werribee, shallow fortnightly cultivations, using a weedknife attached to a cultivator, caused the death of *all* plants after the treatment had been persisted with for two years. Naturally, this method, because of the time and labour involved, can be used only on small areas, and in circumstances where ordinary routine is not seriously interfered with. The process is one of slow starvation of the plants, and there does not appear to be any means of reducing the amount of work involved. At certain times of the year, slightly longer intervals might be allowed to elapse between cultivations, but it is essential that no green leaves be formed, or much of the food reserves used up in producing new shoots will be quickly re-formed and stored again in the roots, and the time necessary for eradication will be correspondingly increased. In very small patches the plants could be cut down with the hoe instead of the cultivator.

Ordinary cultivation stimulates the growth of the weed, and because of the danger of distributing roots over clean ground it is advisable to refrain from cultivating such patches unless a set programme, such as stated above,

is to be adhered to. Such patches are best cultivated by working round and round, starting at the outer edge—although this mounds up the centre, it removes the danger of increasing the area of the patch at each cultivation during the early stages of the treatment. All common-sense precautions in regard to cleaning implements before moving on to clean ground should be taken.

Salting.

It has been shown that salting as a means of eradication is ineffective at Werribee, and analyses of bores from the salted plots indicate that the presence of a relatively impervious clay subsoil, under dry-farming conditions, prevents the penetration of the salt in lethal concentration to a depth of more than 8 to 10 inches. Experiments have shown that the root-system of hoary cress may penetrate over six feet into the ground, and that a chemical treatment, to be really effective, must bring about the rapid death of a high percentage of plant root-systems in the top two feet of soil.

In consequence of the poor penetration of salt under Werribee conditions unsatisfactory results were obtained, even though various methods of increasing penetration were resorted to. Similar difficulty is experienced in the irrigation of this land. Recently, however, the writer inspected some tests on typical black Wimmera soil, which showed a high kill with a dressing of salt at the rate of 5 tons per acre. Analyses of bores from these plots showed the salt penetration in lethal amount to be over four feet, and these observations supported the view that the subsoil type is the main factor in determining whether salting will give a good control of the weed.

In dry-farming areas having reasonably permeable subsoil, salting is the most satisfactory method of attack when a suitable cultivation programme cannot be carried on. The amount per acre required varies greatly with the density of the infestation. In small patches it is better to dose each plant showing with a small shovelful of salt. Plants which re-appear should be treated in a similar manner, and it is necessary to examine the patch at intervals and re-salt the few extraordinarily persistent plants which do not yield readily to the treatment. The second and successive applications, if done within a reasonable time (up to two months), do not present a formidable problem.

Hoary Cress plant and flower.

The quantity of salt required will vary, according to the density of the infestation, from 5 tons per acre upwards. A patch of 10 yards by 10 yards of moderately dense infestation, will require about two bags of salt for the first treatment. As with cultivation, the treatment to be successful must be persevered with. The salt naturally has a deleterious effect on the soil, but this is not necessarily permanent, and at Werribee it has been noted that a particularly good crop was obtained on salted areas five years after salting.

Carbon Bisulphide.

Carbon bisulphide, a volatile liquid, familiar on account of its use in rabbit extermination, may be used effectively against hoary cress in soils which are sufficiently permeable. Another essential is that the soil should be reasonably dry, but not so dry as to allow the escape of

the gas formed. A rapid diffusion of the gas is to be aimed at—if the diffusion is too slow the concentration of the gas in the soil air, a few inches away from the bores, may not be sufficient to kill the roots. The usual procedure is to bore or punch holes to 18 inches deep, 18 inches to 2 feet apart each way, pour in 1½ to 2 oz. of carbon bisulphide and seal the hole immediately.

This is probably the most expensive weed-eradicant in modern use, but in small patches under good conditions its effectiveness justifies the expenditure. Some economy may be effected in very porous soils either by reducing the dosage per hole or by putting the holes down at greater distances apart—the limits of adjustment in these directions can be determined with certainty for the particular conditions only by experiment.

This treatment is useless under irrigation conditions, or near drains or dams. If the holes be put in too deep the bisulphide gas, which is heavier than air, although it kills the roots at a certain depth, may leave untouched roots near the ground surface. These quickly re-enter the subsoil, since carbon bisulphide exercises no permanent poisoning effect on the soil.

Chemical Sprays.

The herbicides found most efficient in the control of deep-rooted perennial weeds at present are the *chlorates* and the *arsenicals*.

The seed head of Hoary Cress; inset, a seed pod.

The *chlorates* have the advantage of not being poisonous to stock except when ingested in fairly large amount (9½ oz. sodium chlorate for a steer and 2 to 3 oz. for a sheep), but they are liable to cause "spontaneous" combustion of clothing and similar material when such material has dried out after spraying.

Specimens of Hoary Cress in the "rosette" stage.

A case is recorded where weed growth sprayed with chlorate burst into flames when dried.

Non-inflammable mixtures appear to be less effective than the pure chlorates. Trials at Werribee with sodium and calcium chlorates were disappointing, and since the arsenicals, and particularly arsenic pentoxide, showed promise under certain conditions, most of the experimental work was directed towards ascertaining the best conditions for the application of the arsenic pentoxide spray. Other investigators report success with heavy and repeated applications of chlorate, and although the expense of such a treatment is high it may be justified under certain conditions.

From the results of the experiments at Werribee, however, it would appear that, so far as hoary cress is concerned, treatment with chlorate will effect no greater improvement than can be obtained at much lower cost with salt, although the chlorate does not affect the soil adversely for such a long period.

At Werribee sprayings as heavy as 600 gallons per acre of 12½ per cent. solution of sodium chlorate were found ineffective in giving permanent results. The plots were sprayed at weekly intervals during the period May to November. This was continued for two years, thus making allowance for variations in weather and soil moisture conditions, and in the growth stage of the plants. As no really satisfactory results were obtained the chlorates are not recommended. It is reported by Sampson and Parker that the addition of glue (1 tablespoonful per gallon) as a spreader, and acidification of the spray with ¼ teaspoonful of sulphuric acid per gallon, greatly increased the efficiency of sodium chlorate spray used against St. John's-wort, but as this information has only recently come to hand the method has not been tried out on hoary cress.

As a variation, investigators are now trying out ammonium thiocyanate (sulphocyanide), with the idea of combining a herbicidal and subsequent manurial action, but no definite results are yet available.

Arsenical Sprays.

In order to appreciate fully the conditions most suitable for the application of arsenical sprays, it is necessary to understand the processes which cause the death of the roots of a plant to a considerable depth below ground after a successful spraying with an arsenical compound. The combined experiences of workers on this problem, notably Kennedy and Crafts in California (working on wild morning glory or bindweed, which has a root system more deeply-penetrating than hoary cress), have suggested the following explanation:—

Traversing the plant from near the root-tips to near the outer surface of the leaves are series of roughly tubular cells arranged end to end which, during growth, have had their end walls dissolved so that they form a continuous series of long pipes throughout the plant. The researches of plant physiologists have led to the conclusion that these *vessels* are the main water reservoirs and channels of sap flow of the plant. When water is rapidly transpired from the leaves, owing to high temperatures, high winds, &c., the rate of removal of water from the plant body is greater than the rate of intake of water through the root-hairs in comparatively dry soil, and the plant for the time suffers from a water deficit which in most cases is eliminated only in the early hours of the following morning. Wilting is prevented by the opposition of the somewhat elastic vessel walls to the compression due to the difference between the internal and external pressure.

If the arsenic pentoxide spray is applied to the foliage and stems at this time, two results are obtained. Firstly, the acidic character of the spray solution is responsible for the death of the outer living cells, and they are rendered

A Suitable Spray Pump.

permeable. Because of the difference between internal and external pressure all moisture free to move is forced into the xylem (vessels) and carried down into the roots. Secondly, the soluble arsenic pentoxide forced in in this way diffuses into the tissues, becomes mixed with the sap, and as the cells collapse, is carried downward. The rate of movement, as measured by eosin solution, was found to be high in comparison with the diameter of the conducting tissue (up to 2½ inches per second in morning glory). With hoary cress at Werribee, similar tests gave a recorded maximum rate of one-half inch per second, under field conditions.

When destruction of the foliage is complete, the tissues become dry, the downward movement in the xylem stops, and the arsenic compound slowly diffuses from the vessels, killing all living cells of the root.

The important practical application of this is that, under ordinary field conditions, even if the water deficit within the plant is large, the success or otherwise of the spraying is determined by the extent to which absorption has taken place before the spray solution has evaporated. When evaporation is rapid, unless the arsenical has penetrated to at least 2 feet down the root system within a few minutes of spraying only poor results are obtained. In view of the above, it is easy to understand why many who have tried out arsenical sprays on deep-rooted perennial weeds have obtained poor results or have found the method unreliable in practice.

The essentials to be recognized for the successful use of arsenical sprays are as follow:—

(*a*) Apply in hot, dry weather when it is reasonably certain that high transpiration has been in progress. The advantage of this is largely lost, however, if the time of spraying is such that the spray fluid evaporates from the plant surface before a good absorption has occurred. In order to overcome this difficulty, spray late in the day, or respray lightly with water the morning following the spraying. This principle has been observed by Burns and Bhide, who used a layer of oil to prevent rapid evaporation of sodium arsenite solution from lantana stumps.

(*b*) Apply to plants whose root systems have not been disturbed by cultivation for some considerable time, otherwise broken roots which show no top growth will not receive any herbicide, and will soon re-infest the soil. It is interesting to note that the extensive cracking of black Wimmera soil, with resultant breaking of roots, is largely responsible for the failure of arsenical sprays in those districts, where salting is found to be the better method.

(*c*) Apply to well-grown plants whose leaf and stem surface is sufficient to hold a reasonable amount of spray fluid during the time required for absorption. For this reason it is not advisable to spray plants in the rosette stage, or at seeding when most of the large leaves have died off. Another factor is the relative amount of food reserves at different growth stages. Sampson and Parker (California) obtained poorest results with chlorate spray when the top growth of St. John's-wort contained the largest amount of total sugars. Arny found the total organic nitrogen content of five perennial weeds to be lowest during early July in Minnesota, and best results were obtained by tillage methods at this time—usually, the beginning of blooming. The importance of this lies in the possibility that the plant sprayed at this time under conditions favorable for penetration and distribution of arsenic has also less chance of recovery due to low reserves of material (other than starch) necessary for the production of new shoots.

(*d*) Apply only to plants under dry-farming conditions, since those growing in moist situations rarely suffer from a sufficiently large water deficit to ensure a good absorption and penetration of arsenic.

The arsenic pentoxide, formerly recommended for use as a 6 per cent. solution at the rate of 120 gallons per acre, applied as a misty spray under a pressure of 100 lb. per square inch, is somewhat difficult to obtain owing to the present limited demand. Crafts has evolved an *acid sodium arsenite* spray which combines the acidity necessary for penetration with the high toxicity characteristic of the arsenites as compared with the arsenates. Although this has not yet been tested out at

Werribee, it may be relied upon as being as efficient as the pentoxide, and considerably cheaper.

The formula given is as follows:—

Mix 4 lb. white arsenic (arsenic trioxide, commercial) and 1 lb. caustic soda in 2½ pints of water. Stir till dissolved. When required for use, make up one part of this stock solution in 100 by weight of water, mix thoroughly, and add five parts by weight of oil of vitriol, observing the necessary precautions of *adding slowly* and *stirring constantly*. It is recommended by Crafts that the stock solution be kept in ordinary iron or wooden containers, but the acid is best added immediately before use. The result is an 0.4 per cent. arsenic-content solution incorporated with a normal solution of sulphuric acid (approximately 5 per cent.).

Although the weed on which this formula gave good results was wild morning glory, which belongs to a different natural order of plants, the principles involved in the action of arsenicals are now sufficiently well understood for one to be able to recognize their application to herbicidal action in general, irrespective in large degree of the species employed in any particular test. For this reason, the above formula is recommended pending the results of further experiments on hoary cress.

Finally, when using arsenical sprays, it is only fair to recognize that failure is due to a wrong selection of spraying conditions, not to any inherent inefficiency of the herbicide. A permanent 100 per cent. kill cannot be expected even under the best conditions, because of variation, under field conditions, in the growth stage, water deficit, and coverage of different plants, and because the arsenical

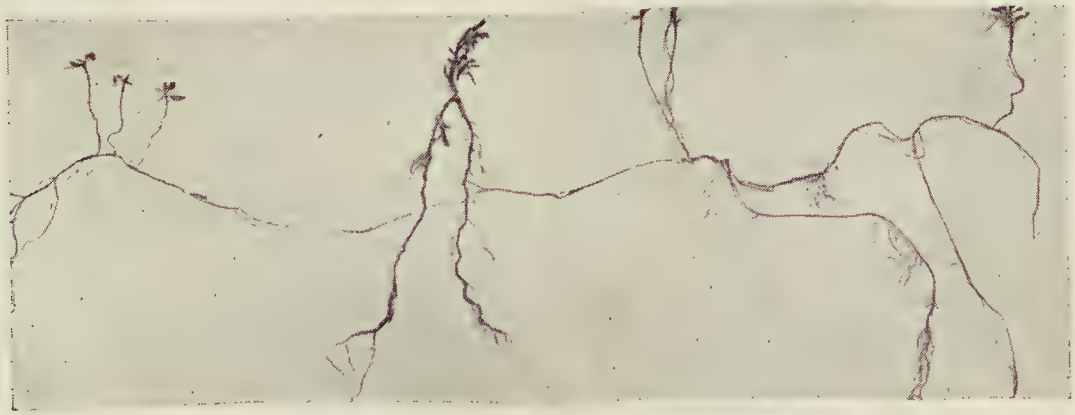
The "rosette" stage.

absorbed frequently does not kill all the horizontal roots which may extend to a distance of 4 or 5 feet from the parent plant, and which may bear a number of shoots which have not yet reached the soil surface.

Plant Competition.

It has been the experience of many farmers in irrigated areas that the sowing down of lucerne or permanent pasture causes the hoary cress to become inconspicuous except around channels and drains, and along checkbanks. This effect is due partly to the competition of the sown species for light, moisture, and plant

(*Continued on page 40.*)



The remarkable root development of Hoary Cress.

Packing Apples & Pears. For Export & Local Markets.

By B. P. Krone, Fruit Packing Instructor.

IF Victorian apple-growers are to compete successfully on overseas markets, it is essential that they should adopt the methods of packing already in use by other large apple-producing countries. Growers in the United States of America, South Africa, and New Zealand already have demonstrated the value of the "straight" method of packing apples in the Canadian Standard fruit case, and if Victorian fruit is to meet that of our competitors on equal terms, it is necessary that we should fall into line so far as this practice is concerned.

The accompanying apple packing chart for the Canadian "Standard" case (inside measurements—18 inches long, 11½ inches wide, and 10½ inches deep) has been revised to meet the needs of the Victorian apple exporter. This has been done after careful consideration, based on experience gained in this State and on observations of the methods of packing in other parts of the world. The diagrams given are self-explanatory, and the chart indicates the methods of packing necessary to produce the various counts.

Experienced packers will notice that the commercial counts have been reduced to a minimum and, to avoid confusion, "foreign counts" are not described or shown. Any count not shown on the chart may be regarded as a "foreign count," and is not recommended for export.

The "straight" method of diagonal packing is not new to Victorian apple-growers, as they have already adopted it for most of the small as well as for some of the large sizes. Citrus-growers also have adopted it for a number of years with success for all sizes of oranges both for local and export markets.

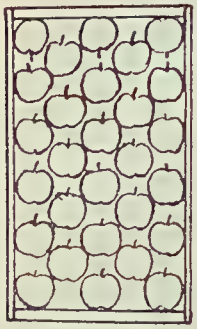
With the more general adoption of this method of packing, bruising and stalk damage will be largely decreased in comparison with the "angle" method, which causes the stalks of certain apples to press against the cheeks of others.

Packing.

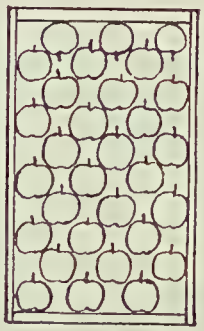
All the counts are packed on the diagonal system; but instead of the apples being placed at angles to one another, they are placed in the cases with their stalks facing in one direction with the exception of the last apples in each layer which are reversed to prevent stalk damage, as is done with oranges. This is shown in the accompanying diagrams.

The correct height cannot be obtained unless the packer regulates the tightness of the pack in accordance with the size of the apples for a given style of pack. The following rule

therefore should be observed:—The smallest apples intended for the 3–3 and 3–2 packs should be packed a little more tightly than usual, while the largest apples intended for these packs should be packed more loosely than usual.



3-2 Pack.



3-3 Pack.

The "straight" method of diagonal packing.

The accompanying diagrams illustrate the "straight" method of diagonal packing which is necessary in order that the stalks will fit in the spaces between the fruit and not damage it. The last apples in each layer are reversed. Remember that "angle" packs are obsolete; they produce foreign counts, and must not be used for export.

It has been found from experience that the most suitable bulge across the centre of the case, before lidding, is approximately $1\frac{1}{2}$ inches, while at each end of the top layer the apples should not project more than about $\frac{3}{8}$ inch, otherwise bruising will occur in the lidding process. The bulge is obtained by selecting apples very slightly smaller than the rest for the beginning and end of each layer.

Corrugated cardboards should be used at both the top and bottom of the case. Cardboards manufactured in fast colours should be selected and placed in such a manner that the corrugations face the wood of the case and do not touch the fruit.

Sizing.

It is imperative that the counts and not the size should be branded on the ends of the cases. Remember that standardization of counts is vital when packing apples for export. *The most suitable counts for export are from* 234 *to* 125 *inclusive. The* 175 *count is an exclusive count for flat apples. Do not export Jonathans under this count.* It should be pointed out that the count is the

Grading and Packing Apples at a Victorian Fruit Packing Shed.

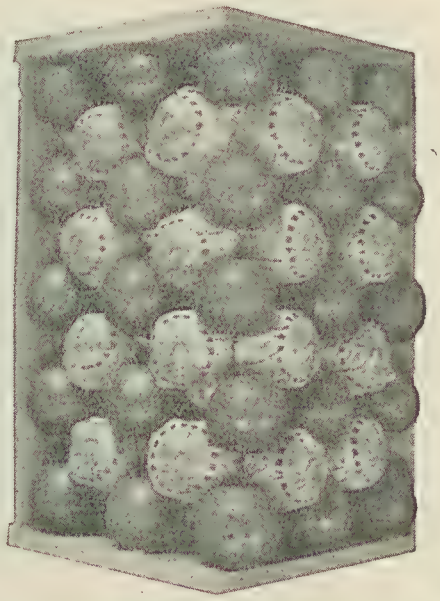
essence of the contract, and not the diameter of the fruit. The apples in each case should, of course, be approximately one size. The diameters shown on the chart should be used as a guide only; these may vary slightly with some varieties of apples. The packer will readily understand that the diameters must be sufficiently large to permit each case being filled to its maximum capacity, but no more.

Incorrect packing of the 125 count is the chief cause of under-weight cases arriving in the United Kingdom. Apples too small for the count are responsible.

Wire seal all cases to prevent breakage and ullage in transit. Specifications of timber required for the Canadian "Standard" case:—

Ends.—2 pieces, 11½ inches long, 10½ inches wide, ¾ inch thick.
Sides.—4 pieces, 19½ inches long, 5⅛ inches wide, ⅜ or 5-16 inch thick.
*Tops and bottoms.—4 pieces, 19½ inches long, 5½ inches wide, 3-16 inch thick.
Cleats.—4 pieces, 11½ inches long, ¾ inch wide, ⅜ inch thick.

*Tops are also cut ¼ inch longer to allow for the bulge.



Granny Smith Apples packed in the standard case.

PACKING CHART FOR THE CANADIAN CASE.

Size.	Pack.	Layer.	Layers.	Total.	Remarks.
Inches.					
2¼	3–3	8 x 7	6	270	Flat and round shapes. Pack more tightly than usual.
2 5/16	3–3	7 x 7	6	252	All shapes. Pack more tightly than usual.
2⅜	3–3	7 x 6	6	234	All shapes. Normal pack.
2 7/16	3–3	6 x 6	6	216	All shapes. Normal pack.
2½	3–3	6 x 5	6	198	All shapes. Normal pack.
2 9/16	3–3	5 x 5	6	180	All shapes. Pack more loosely than usual.
2 11/16	3–2	7 x 7	5	175	Flat apples only. Pack more tightly than usual
2 11/16	3–2	7 x 6	5	163	All shapes. Normal pack.
2¾	3–2	6 x 6	5	150	All shapes. Normal pack.
2 13/16	3–2	6 x 5	5	138	All shapes. Normal pack.
2 15/16	3–2	5 x 5	5	125	All shapes. Normal pack.
3 1/16	3–2	5 x 4	5	113	All shapes. Normal pack.
3 3/16	3–2	4 x 4	5	100	All shapes. Normal pack.
3 5/16	2–2	6 x 6	4	96	Flat apples only. Pack tightly
3 5/16	3–2	4 x 3	5	88	Round apples. Pack more loosely than usual.
3⅜	2–2	6 x 5	4	88	Flat apples only.

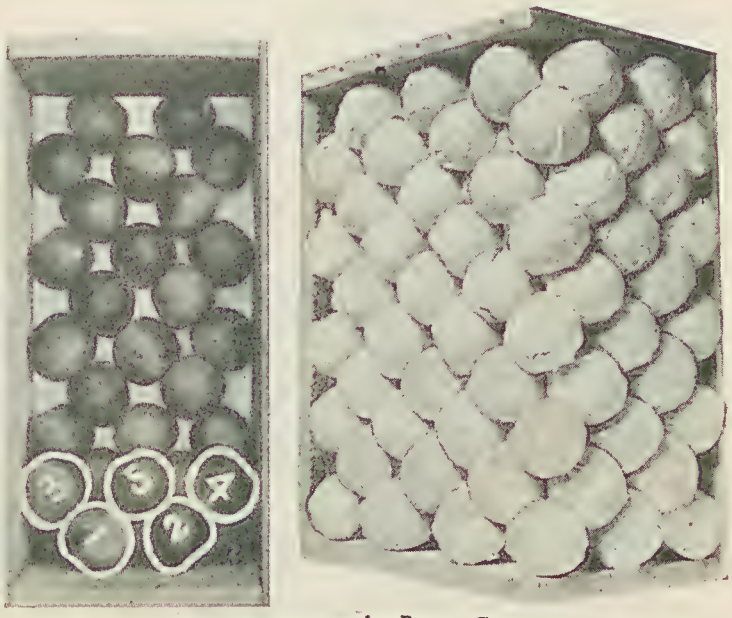
THE AUSTRALIAN DUMP CASE

No change has been made in the method of packing the Australian Dump Case. The "angle" method of diagonal packing is still recommended.

All exportable sizes, irrespective of the pack, fit firmly but not too tightly in the Dump case. The apples should not be packed too high or too low; either is harmful, and results in bruised fruit. For the best results the top layer should project about ½ inch above the top of the case before lidding.

Corrugated cardboards manufactured in fast colours should be used at the top, bottom and each side of the cases; these should be placed in such a manner that the corrugations face the wood of the case and not touching the fruit.

Lack of uniformity in the manufacture of this case has, from time to time, been the cause of severe criticism from the export trade; therefore the following specifications should not be varied in the slightest particular :—



The 3-2 Pack in the Dump Case.

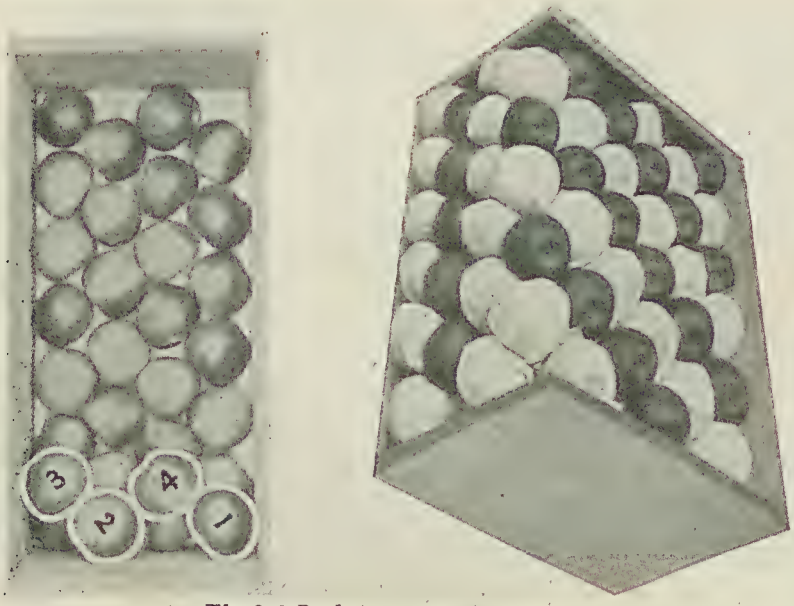
The illustration on the left shows how to commence the first and second layers. Note the angles at which the apples are placed. The numbers show the commencement of the second layer with the apples resting on the pockets or spaces caused by the way the fruits beneath are packed. The illustration on the right shows the finished case of 2¼ inch apples, 5 x 5 layer, 7 layers: Total 175.

Ends.—2 pieces, 14¼ inches long, 8⅝ inches wide, ¾ inch thick.

Sides.—6 pieces, 19½ inches long, 4⅝ inches wide, ⅜ inch thick.

Tops and bottoms.—4 pieces, 19½ inches long, 4¼ inches wide, ¼ inch thick.

(These specifications apply only to softwood, or seasoned and dressed hardwood.).



The 2-2 Pack in the Dump Case.

Left.—The numbers show the angles at which the apples should be placed in the first and second layers. Right.—Finished case of 2¾ inch apples, 6 x 5 layer, 6 layers; Total 132.

When the dump case is used counts smaller than 245 or larger than 120 are not recommended for export. The accompanying chart shows methods of packing all sizes of apples from 2¼ inches to 3½ inches but growers are strongly advised not to export fruit 3 inches and over in diameter.

CHART FOR PACKING APPLES IN THE AUSTRALIAN DUMP CASE.
(Inside measurements, 18 inches long, $8\frac{2}{3}$ inches wide, $14\frac{1}{4}$ inches deep.)

Approximate Size.	Pack.	Layer.	Layers.	Total.	Remarks.	Average net Weight if Rome Beauties.	Average net Weight if Jonathans.
Inches.						lb.	lb.
$2\frac{1}{4}$	3–2	8 x 8	7	280	Small flat shape	..	..
	3–2	8 x 7	7	263	Flat shapes	..	..
	3–2	7 x 7	7	245	Small quarters	$49\frac{1}{2}$	43
	3–2	7 x 6	7	228	Medium quarters	49	43
	3–2	6 x 6	7	210	Large quarters	48	42
$2\frac{1}{2}$	3–2	6 x 5	7	193	Small halves	47	43
	3–2	5 x 5	7	175	Medium halves	46	42
	3–2	5 x 4	7	158	Large halves	..	..
	2–2	7 x 7	6	168	Large halves—seldom used	..	..
$2\frac{3}{4}$	2–2	7 x 6	6	156	Small three-quarters	45	42
	2–2	6 x 6	6	144	Medium three-quarters	45	42
	2–2	6 x 5	6	132	Large three-quarters	45	42
	2–2	5 x 5	6	120	Large three-quarters	..	..
3	2–2	5 x 4	6	108	Small to medium	..	..
	2–1	7 x 7	5	105	Flat shapes	..	..
	2–1	7 x 6	5	98	Flat shapes	..	..
	2–1	6 x 6	5	90	Large 3-in.	..	..
$3\frac{1}{4}$	2–1	6 x 5	5	83	..	..	..
	2–1	5 x 5	5	75	..	..	..
	2–1	5 x 4	5	68	..	..	..
	2–1	4 x 4	5	60	..	..	..
$3\frac{1}{2}$	2–1	4 x 3	5	53	..	..	..

PACKING PEARS FOR EXPORT.

The most important factor in the export of pears undoubtedly is the stage of maturity at which the fruit is harvested. Errors in harvesting are readily discernible in the Williams Bon Chretien variety, large numbers of which are exported annually. The following hints may help in the elimination of these defects:—

The best time to harvest pears (particularly the W.B.C. variety) is indicated by—

1. The change of the ground colour of the skin from dark green to pale green.

An apple-packing class at work.

2. The changing of the dots or lenticels from a light to a dark or corky appearance.

3. The well-filled-out appearance of the pear.

4. The ease with which the fruit can be separated from the spurs when harvesting.

5. In a pear ready for harvesting the juice immediately rushes to the surface when a slice is cut from the fruit; if it remains dry the fruit is still immature.

Temperatures.—Pears should remain in cool store at least 48 hours before packing; the temperature should be 29–31° F.

Temperature of the truck before loading should be 50–56° F.

The core temperature of pears at loading should be 30–35° F.

If these suggestions be followed closely the temperature of the truck upon arrival at the boat should be 40–45° F., with the core temperature of the pears between 35 and 40° F.

On no account should the temperature of Williams Bon Chretien pears on arrival at the boat for export be more than 45° F.

W.B.C. Pears packed for export in the 8½-inch "Standard" Pear Case.

Chart for pears in the 8½-in. Standard pear case (18 inches long, 11½ inches wide, 8½ inches deep—inside measurements).

Approx. Size.	Pack.	Layer.	Layers.	Total.	Remarks.
Inches.					
2	4–3	7 x 7	5	245	
	4–3	7 x 6	5	228	Small
	4–3	6 x 6	5	210	Medium
	4–3	6 x 5	5	193	Large
2¼	3–3	6 x 6	5	180	Small to medium quarters
	3–3	6 x 5	5	165	Medium to large quarters
2½	3–3	5 x 5	5	150	Small to medium halves
	3–3	5 x 4	5	135	Medium to large halves
2¾	3–3	4 x 4	5	120	Small three-quarters
	3–2	6 x 6	4	120	
	3–2	6 x 5	4	110	Medium three-quarters
	3–2	5 x 5	4	100	Large three-quarters
3	3–2	5 x 4	4	90	Small to medium 3-in.
	3–2	4 x 4	4	80	Medium to large 3-in.
3¼	3–2	4 x 3	4	70	

The 8½-inch Standard Pear Case.

The packs shown on this chart embrace long, medium, and short varieties. They have become standardized in the markets of the world. Packs other than these are known in the trade as foreign counts. A bulge of approximately 1½ inches is necessary when packing this case, the net weight of which should not be less than 42 lb.

The sizes shown are approximate, and intended to serve as a guide; they may vary slightly, but this will depend whether long or short types are packed. It is important that the count, and not the size, should be shown on the end of the case.

Correct height is obtained by regulating the tightness of the pack in accordance with the

size of the pears for a given style of pack; therefore, the smallest sizes of the 4–3, 3–3, and 3–2 packs should be packed a little more tightly than usual, while the largest sizes of these packs should be packed a little more loosely than usual.

Specifications of timber required to make the standard pear case are as follows:—

Ends.—2 pieces, 11½ inches long, 8½ inches wide, ¾ inch thick.

Sides.—2 pieces, 19½ inches long, 8½ inches wide, 5-16 inch thick.

*Tops and bottoms.—4 pieces, 19½ inches long, 5½ inches wide, 3-16 inch thick.

Cleats.—4 pieces, 11½ inches long, ¾ inch wide, ⅜ inch thick.

*Tops are also cut ¼ inch longer to allow for the bulge.

Salient Points for Export.

If the lids are in two pieces, keep them as close together as possible to prevent cutting the fruit.

Corrugated cardboards should be used at the top, bottom, and sides of the case when packing.

In all instances, the W.B.C. pear should be pre-cooled before export.

Wire-tie all cases to prevent breakages and ullage in transit.

Machine grading of pears can be recommended if the operation is carried out as soon as the fruit is harvested and before cool storage. On no account should light skin varieties be machine graded while excessively cold.

The "Long" Bushel Case.

PACKING CHART FOR PEARS IN THE "LONG" BUSHEL CASE.

(26 inches x 6 inches x 14¼ inches, inside measurements, clear of the division.)

Approximate Size.	Pack.	Layer.	Layers.	Total.	Remarks.
Inches.					
Medium and Short Types, such as Packham's, Josephine, &c.					
2	2–2	4 x 3	8	224	Normal pack
2⅛	2–1	5 x 4	8	216	Normal pack
2¼	2–1	4 x 4	8	192	Normal pack
2⅜	2–1	4 x 3	8	168	Normal pack
2½	2–1	3 x 3	8	144	Pack more loosely than usual
2⅝	2–1	3 x 3	7	126	Normal pack
2¾	2–1	3 x 2	7	106	Pack more loosely than usual
2⅞	2–1	3 x 2	6	90	Normal pack. If Howell, &c., mix 106 and 90 and pack as 96
3	1–1	4 x 4	6	96	Stalks face centre of case
3⅛	1–1	4 x 3	6	84	Stalks face centre of case
Long Types, such as Beurre Bosc, &c.					
2⅛	2–1	4 x 4	8	192	Normal pack
2¼	2–1	4 x 3	8	168	Normal pack
2⅜	2–1	3 x 3	8	144	Normal pack
2½	2–1	3 x 2	8	120	Pack more loosely than usual
2⅝	2–1	3 x 2	7	106	Pack more tightly than usual
2¾	1–1	4 x 3	7	98	Stalks face centre of case
2⅞	1–1	4 x 3	6	84	Stalks face centre of case
3	1–1	3 x 3	6	72	Stalks face centre of case
3¼	1–1	3 x 2	6	60	Stalks face centre of case

Specifications of timber required to make the "Long" Bushel case are as follow:—

Ends and centre—3 pieces, 14¼ inches long, 6 inches wide, 11-16ths inch thick.

Sides—6 pieces, 28 1-16 inches long, 4 11-16 inches wide, ¼ inch thick.

Lids and bottoms—2 pieces, 28 1-16 inches long, 6 inches wide, ¼ inch thick.

Potato Growing in Victoria

No. 6.—Preparations for Planting

By J. T. Ramsay, Potato Expert.

Previous articles of this series, which appeared in the March, April, May, July and December issues of the Journal, dealt with the condition and selection of seed, seed storage methods, change of seed, plant food requirements and the use of artificial fertilizers.

IN outlining the cultural operations by which land intended for a potato crop may be prepared, it is impossible to lay down any hard and fast rule which would suit all sorts and conditions of soil. This is so because there is such great variation in the soils, which may be of sand, clay, or any of the many gradations between these two extremes.

Again, varying climatic conditions demand varying treatment, and the times at which different classes of soils can be treated most advantageously will differ in the several districts. Notwithstanding all these variations, the object to be aimed at in preparing land for a potato crop, or any other crop demanding intense culture, is the correct mechanical condition of the soil or, in other words, the correct tilth.

Many land-owners possessed of country which is naturally very fertile do not seem to appreciate the necessity of producing this condition of soil for the reception of seed. They appear to think that since they are planting seed in rich land, little more is necessary. Soil may be rich, and yet be in such a poor physical or mechanical condition as to render it entirely unsuitable for the free development of plants of high economic value.

The production of genial conditions for the reception of the seed of the potato crop is secured by the utilization of such implements as will reduce the soil to a condition of tilth which will make it amenable to the needs of the crop. There are several good reasons why this particular mechanical condition of the soil is essential. First, such a condition allows the roots of plants to branch out without restriction in search of food; secondly, useful bacterial activity is encouraged; and thirdly, percolation of water is promoted and evaporation of moisture retarded.

Wherever the depth of the soil will permit, the first ploughing should be to a depth of 7 to 9 inches, and the second about 2 inches shallower. There are many cases where the top soil is so shallow that this depth is out of the question. On land where the surface soil does not extend below from 5 to 6 inches, care should be taken not to plough to a greater depth than surface soil.

In addition to the mould-board plough, the disc or spring-tooth cultivators, the roller, and the harrows, all play an important part in the production of a good seed-bed. After the second ploughing the disc or spring-tooth cultivator should be used to further break down the

soil. It is possible that only one or two strokes of the cultivator will be required to produce the desired effect. However, it is always well to err on the side of over-cultivation rather than under-cultivation.

It is not necessary or advisable to work the soil down too finely, as in the event of heavy rain falling it is liable to run together and become so closely set as to necessitate the whole of the ploughing and cultivating being gone over again.

Under normal conditions, however, if two ploughings and two disc or spring-tooth cultivations are given, the land may be allowed to lie in that condition until the time of planting. In the event of rain falling in any quantity subsequent to these operations, opportunity should be taken, as soon as the ground is in fit condition to carry horses or tractor, to run over it again with one or other of the cultivators. Harrowing at this stage is not necessary, and should be left until just before planting commences.

It is important at this season of the year to go over seed stocks in order to prepare them against the approaching planting times. Seed in boxes will require very little attention, as seed so stored keeps in the best of condition. But it is just as well to look over these lots and remove any tubers which have dried off as the result of injury received at digging time from the fork or machine, and also any showing signs of spindly growth or decay from disease.

This saves carting useless tubers on to the paddock, where they are liable further to spread the cause or causes of their decay. In cases where seed has been stored in bags or pits, attention and overhaul are much more necessary than where the seed has been stored in standard boxes. This is a very important routine operation which should receive immediate attention. Every effort should be made to prevent tubers from over-sprouting, with a consequent weakening of the seed and an increasing liability of damage to the sprouts. To prevent this over-sprouting, pits should be opened up and their contents turned over.

While this is being done, opportunity should be taken to remove all tubers which are showing any sign of decay whatever. There are sure to be some which have been pitted in a

Selecting Seed from the Pit.

Preparing Seed for Planting. (*Argus Photo*).

Poor Germination due to faulty seed.

damaged condition, and a varying percentage of tubers in which bacterial rot has made headway since they were placed in this storage.

After sorting over and eliminating disease-affected tubers, it is advisable that the contents of the pits be spread out at a depth of not more than about 4 inches, preferably under trees. If this be done, any tender white shoots that are showing will be hardened off by the action of the light. The same agency will green and toughen them. By this means they will be rendered fit to withstand the handling incidental to planting without sustaining much damage. Another beneficial effect of opening up the contents of the pits and spreading them out is that excessive growth of the sprouts will be checked.

It is important that the original sprouts on the tubers be kept intact so far as possible. If these be damaged or broken off the seed is considerably weakened and its value much reduced. Even though the shoots be broken off, in the majority of cases they will grow again, but the subsequent growths will be very much less vigorous than that from the original bud.

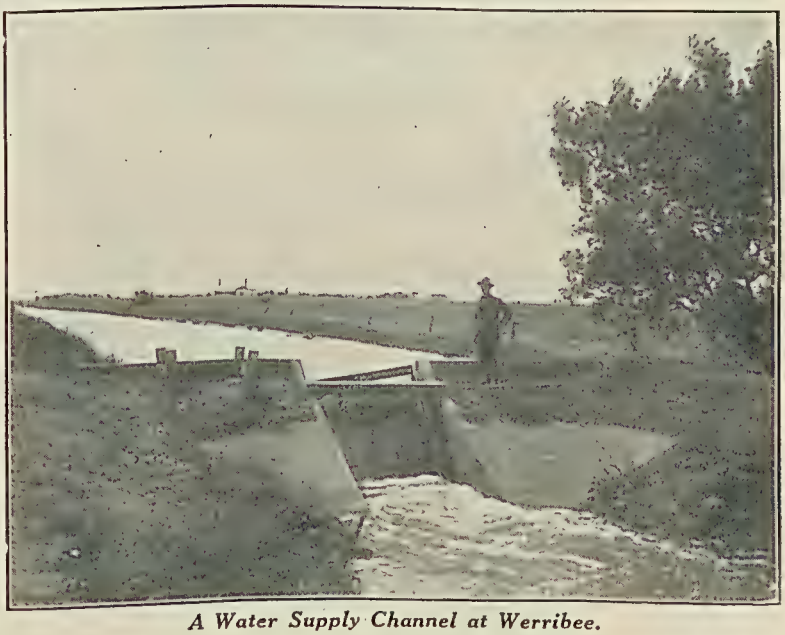
Where seed has been stored in bags, excessive sprouting can be prevented by turning the bags upside down at first, and reversing the standing position of the bags about every week or ten days. While this periodic inversion of the bags will tend to check the growth of the sprouts, there will be considerable damage done to the young sprouts, many of which will suffer bruising or breaking. Because of this, it would be much better if seed which has been stored in bags were subjected to the same treatment as that already recommended for seed potatoes which have been stored in pits, that is, they should be opened right up, overhauled, and spread out to the light and air until such time as they are required for planting.

It would be difficult to estimate the annual loss to the potato-growers of Australia through faulty storage of seed, but it must run into thousands of tons in the aggregate. The greater part of this loss could be obviated by the use of the proper seed potato-boxes. These storage-boxes, or trays, are now standardized here, and are so well known as to make their description unnecessary. Since I first introduced them into Victoria a large number of the growers in the more important potato-growing districts of Victoria have adopted them for use, and they are becoming increasingly popular. It is safe to predict that before many years the growers of consequence who do not practise this well proved and highly economical system of potato seed storage will be the exception rather than the rule.

Dipping of seed is a most advisable operation which can be attended to any time prior to planting. During the past few years the

Boxed Seed Ready for Planting.

fungus disease Rhizoctonia or Collar Stem rot has made considerable headway and caused enormous damage to potato-crops. While this disease is prevalent, fortunately, it is one of the simplest and easiest to control. The control consists of dipping all potatoes intended for seed in a solution made from formalin and water. This may be done at any time during the storage period between harvesting and planting. The proportion recommended is 1 lb. of formalin to 20 gallons of water, and the period of immersion should be 1½ hours. This strength is advised for unsprouted potatoes; for sprouted tubers the strength of the solution should be reduced to 1 lb. formalin to 30 gallons of water, the time of immersion being the same. Corrosive sublimate (mercuric chloride) also is a most effective dip, but being highly poisonous its use is not generally advocated. The solution of mercuric chloride is odourless, colourless, and practically tasteless—hence its danger. The formalin treatment is quite effective in Rhizoctonia control, and can be practised without danger. It is also inexpensive and easy to use. In one recent test the dipping of seed resulted in an increase in yield of no less than 3 tons 10 cwt. per acre over the untreated seed. Dipping is strongly advised in all cases.



A Water Supply Channel at Werribee.

POTATO PRODUCTION UNDER IRRIGATION.

With the development of irrigation within the State there has been a gradual increase in the variety of crops treated by this method. Irrigationists in increasing numbers, for some years past, have been devoting attention to the production of potatoes, and many have obtained very successful results. On account of the amount of labour involved in the work of irrigating and cultivation, the growth of large individual areas is not advisable, as this entails the retention of a large staff of men and horses to cope with the work which recurs at rush periods during the growing season. These rush periods are sandwiched between times of comparative idleness, which, of course, materially increases the cost of production.

In outlining the procedure for growing a crop of potatoes under irrigation, it is impossible to lay down any set of rules which would ensure the maximum crop in every season and every variation of soil. For instance, it might be necessary in some seasons, owing to the dryness of the soil at the date of planting, to irrigate prior to planting, while, on the other hand, the soil might contain sufficient moisture from natural rainfall to obviate the application of water from the channels. Again, some soils have greater power of retention of water than others, and, therefore, require less irrigation water to produce the same result. Then, again, the climatic variation of the seasons might necessitate four or five irrigations (as in a dry year) or none (as in an abnormally wet year). These illustrations will be sufficient to prove that no rule-of-thumb method can be advised. The first fact to be grasped is that the potato is a moisture-loving plant, and from the time of planting the crop to the time when it is just past the full bloom, the soil should be kept as near as possible in a moist condition without being excessively wet. Certainly,

at times of irrigation excessive wetness must obtain, but intelligent irrigation and the immensely rapid evaporation common to all districts where irrigation is practised, will reduce the actual time of excessive wetness to a harmless period.

Irrigating Potatoes.

Time of Planting.

Planting should be done as early as possible, the optimum time, of course, varying with the district. On the Werribee settlement, planting in the average season can be commenced with safety at the end of July, but in the northern parts of the State the average date for safe planting is as late as from the beginning of September.

The factor governing the date of planting is the incidence of spring frosts. The later these are liable to occur, the later planting must be delayed. Supposing, in the average year, spring frosts in a district are not likely to occur later than the beginning of September, then planting may be done with comparative safety in the middle of August, as the plants would not be through the ground in time to suffer damage. Broadly speaking, planting may take place with safety from two to three weeks prior to the probable date of the last spring frosts. Thus growers must be guided as to the date of planting by the spring frost records of their districts. Crops may be protected from frosts by means of smudge fires, but it is more practicable and less expensive to seek safety in later planting.

The first essential is that the land should have been thoroughly graded in order to facilitate the even distribution of the water. If dry, the land to be planted should be irrigated first. As soon as it can be worked after irrigation it should be cultivated both ways, with either the spring-tooth or disc cultivator. Immediately afterwards it should be harrowed. Ploughing and planting should then be commenced.

The quickest and most convenient plough to use is the three-furrow mouldboard, followed by manure sower and planters (hand labour). It is possible to obtain an attachment which may be fitted to the three-furrow plough, and by means of which the manure is dropped mechanically, and the driver sows the sets himself by dropping them through a funnel into the row in front of one of the furrows, where they are covered immediately. Because of its cost, however, such a machine would be justified only where a comparatively large area was being planted.

Failing possession of a three-furrow plough, a double-furrow and a single may be used together, or planting may be done with the single-furrow alone. Whichever plough is used, the furrows should be set to cut a width of 9 inches, and planting should take place in every third furrow, i.e., the rows should be about 27 inches apart. The sets should be planted at a depth of not less than 5 inches, and from 14 to 15 inches between the plants in the row.

Care should be taken to harrow each day's planting on the day of planting; in fact, it cannot be harrowed too soon after planting takes place. The object of this is, of course, to conserve moisture.

Early varieties only are recommended, as, on account of their shorter period of maturation as compared with late sorts, the margin for error in their cultivation is lessened, with beneficial results to the grower. The weight of seed per acre recommended is not less than

[*Continued on page 30.*

Young Farmers' Clubs

By A. J. Gill, Senior Herd Tester

THE Young Farmers' Club movement originated in England over twenty years ago, and since then has made steady progress. It has spread gradually to other countries, and each year now judging competitions, in which teams from Canada, Argentine, Ireland, Scotland, and the United States compete, are held in England.

In the United States, the movement has been taken up with enthusiasm, and it is estimated that over one million children are receiving instruction in farm work through the medium of the clubs. Banking companies, business institutions, and railway companies are assisting the movement in many ways.

Throughout the United States, the clubs are known as the 4 "H" Clubs. Each member is issued with a metal badge in the form of a four-leaved clover, on each leaf of which is stamped the letter "H" representing the child's most valuable assets—head, hands, heart, and health. On becoming a member, each child sings a pledge which reads: "I pledge my head to clearer thinking, my hands to greater service, my heart to greater loyalty, and my health to better living for my country, community, and club."

In Victoria, the movement already has proved its value, a pleasing feature in many centres being the continued attendance at the club's classes of members who have left school, but wish to continue their studies in club work.

The first move in this State was made in 1917, when Mr. D. Griffiths, a local solicitor, founded the Gala Calf Club at Geelong. To-day, Gala Calf Club Day, held in conjunction with the Geelong Agricultural Show, is an event of importance. As a result of the activities of this club, between 300 and 400 head of pure-bred stock of various breeds are now owned by Gala Calf Club members.

The first club known as a Young Farmers' Club, however, was formed at Newlyn in March, 1927. This and other clubs in the Ballarat district came into being as a result of the work of a committee formed in Ballarat, and which included members of the Rotary Club, teachers from various schools in the surrounding districts, and many of the leading business men of the city. Later, an auxiliary committee was formed, consisting of the parents of members (each club sending one representative) to assist the parent body.

The motive behind the idea which gave rise to the formation of the clubs was to give all country children who desired it a general farm education to prepare them for the future work on the land; to improve stock in the district; to teach bookkeeping and the value of records of receipts and expenditure; to teach teamwork and the value of co-operation; to introduce suitable side-lines on the farm; and to give a good general education in all branches of farming. But, in addition to these advantages, club work has rendered the ordinary school tasks, by association with the more congenial work of the club, more agreeable, and as the child advances in his studies, bookkeeping and business principles in their relation to primary production are more readily appreciated. What previously were

regarded by them as dull, meaningless figures are now found by these practical young farmers to have a vital bearing on their ultimate means of livelihood. As a consequence, many teachers report a general improvement in the attention paid to routine school studies.

Many home activities, such as cookery, sewing, fancy work and decorative work, are an important feature in the girls' section. Of course, girls as well as boys take part in the outdoor work, but the clubs, quite cognizant of the important part played by the home in farm life, have included many of its activities in their list of projects, of which a number such as wirework and metalwork, are done by both girls and boys.

Although the district in which the club is situated determines to a large extent many of the projects to be included in its list, such important phases of farm management as pasture development, cultivation of the soil, conservation of fodder, feeding of stock, care and judging of all farm animals, carpentry, horticulture, and the growing of vegetables are included in the curricula of the majority of the clubs. In many clubs the list of projects embraces methods dealing with problems that the farmer at the outset has to face. One of these is to study the procedure, in theory, necessary for the purchase of a farm, such as the purchase agreement, cost of transfer, mortgages, renewals, overdrafts, interest, and miscellaneous costs connected with such a transaction. Other matters studied are agreements regarding fencing contracts, purchase of stock, utensils, &c.; cost of timber,

Proud of her Jersey heifer.

sheds, and plans, capacity of drains and water-tanks; the establishment of pastures; the cost and manner of raising and marketing produce; the questions of cartage and railway freights, commission, insurance, &c.; the amount of fodder to be conserved per animal; the importation of pure-bred stock, and quarantine regulations concerning their entry into Victoria. The children are encouraged to keep a graph of market prices of various products throughout the year, so that they may ascertain the most suitable time to market their produce.

At the comemncement of club work, each child must be given a project. If the project cannot be an animal, it may be a plot of land, which the child will be called upon to look after as something from which monetary returns may be made. All children are thus able to commence a banking account. The child is taught and advised how to carry out the work,

Judging Club Members' exhibits at the Ballarat Show.

but the actual responsibility for its conduct is thrown as much as possible on the child's shoulders. This tends to encourage traits of self-reliance and independence, and creates a desire to succeed, and, if possible, to excel.

The introduction of good cattle, pigs, sheep, and poultry, illustrates the value of good pure-bred stock, the influence of which is soon experienced in the district, and children, having learned their value as compared with inferior stock, will never go back to the poorer class of stock. This was particularly noticeable in one district, where previous to the institution of a Young Farmers Club, no pure-bred stock existed. Twelve months following the formation of this club, 50 head of valuable pure-bred cattle were introduced.

Prize-winners.

At intervals lecturers are obtained to give instruction on the use and value of experimental plots. These lectures are of value, not only to the children, but to district farmers. Visits are paid to the farms of cattle and sheep breeders, poultry-farmers, and orchardists, lectures, demonstrations, and judging competitions being held.

A good method of teaching the first principles of book-keeping is to allow the child to make up his accounts of receipts and expenditure, in respect of his own particular project or projects. A book is kept by each member for guidance in club work. In the book weekly entries are made of the project or projects undertaken; remarks on whatever experimental work the club is doing, together with references to its development. A bold headline should indicate the nature of the matter following. The book should be indexed, and will prove of valuable assistance in after years. Another portion of the book should be set aside for extracts from lectures, notes on the treatment of stock diseases and care of wounds. A record of rainfall and temperatures throughout the year should also be kept, while an indexed scrap-book containing photographs of leading animals and features of interest, with clippings from newspapers containing advice and instruction will be of considerable help.

Club work teaches team-work, creating community spirit, which leads to a greater appreciation of the value of co-operation in after life. Visiting various farms, listening to different lecturers, and noting each other's experiences, help to give the child a good general farm education. Even though some of the subjects do not deal with the particular branch of farming he will eventually follow, the work provides knowledge which may be of indirect value, and at the same time give a greater all-round contact with genaral farm-work. The discussions and debates held in connexion with club activities are invaluable in teaching the children how to express themselves in public, to reason coolly, and to look at questions from different angles.

The annual show, or picnic, held in connexion with club work soon becomes an interesting event. Prizes are given, stock competitions are held, and various projects are exhibited. With each exhibit the child's note-book is shown. A maximum of 50 points is given for the exhibit, and 50 for the club book, the highest aggregate number winning.

In the strong Ballarat centre, two shows are held yearly, one for stock exhibition, taking place in conjunction with the Agricultural Show, held in November, and the other, the Home Projects Show, held in April, where competitions for vegetables, flowers, rope-work, metalwork, wirework, leatherwork, carpenter-

Ayrshire heifers and their young owners at the Ballarat Show.

ing, woodwork, hobbies, cooking, sewing, jam-making, and fruit-preserving are held. The five latter projects are of course specially for the girls.

In the early days of the movement it was realized that in choosing a project it would be advisable, if possible, to allow the child to follow his or her particular aptitude, and children were not forced to confine their attention solely to one project. Club members might have vegetables, cattle, and poultry if they chose, provided they demonstrated an ability to manage them.

As a general guide to the selection of projects, the following list may be useful:—Cattle, sheep, poultry, pigs, bees, pasture plots, crops, fruit, vegetables, potatoes, flowers, bulbs, carpentering, blacksmithing, tinwork, ropework, fruit-preserving, jam-making, cooking, and sewing.

The work of conducting each project should rest on the child as much as possible. The animal or produce should be the property of the child, and all money banked must be in the child's name. Where children cannot keep stock, they may become members, keep a note-book on club work, and attend all lectures.

Stock may be obtained either by donation, cash purchase, purchase on terms, or on the exchange system. By the exchange system, a child may obtain a clutch of eggs, returning the same number from the first eggs of his fowls. A member given a young sow pig would return a sow pig from the first litter. With poultry or pigs this system works well, but owing to the length of time before a calf comes into profit, it is not so popular in regard to cattle.

In purchasing stock, terms usually are necessary. Sometimes a joint and several agreement, signed by parents, enables money to be obtained from the bank. It is usual for the child to repay in instalments of 2s. to 3s. each week. Stock may be donated direct to a child, or, when donated direct to the club, they are sometimes drawn for by lot.

The committee will arrange for instruction where several clubs can come together. Lectures should be arranged for at intervals. The services of the local banker to lecture on finance, the municipal engineer on draining, building culverts, &c., and local breeders of pure-bred stock usually can be obtained.

One of the lessons it is desired to impress on the children's minds is that the mere possession of pure-bred stock is not sufficient, and that it is not the multiplication of pure-bred stock that is needed, so much as a thorough appreciation of the need for better stock.

How to form a Club.

To form a club, the school teacher or other interested person in the district should call a meeting of parents, members of the local agricultural society, leading business people, and, where possible, the district school inspector, and dairy supervisor.

The prospective activities and objectives of the club should be fully explained. Usually it is found that such meetings are very enthusiastic. The names of children over eight, and to whatever age the meeting decides upon, who wish to become members, should then be taken. Usually the head teacher of the local school attends to these matters, and almost always acts as secretary. A committee

of residents is formed to assist in the work, and in obtaining the necessary stock.

Next a club leader should be appointed. This is usually the head teacher, because of his influence with the children. If the teacher is the club leader, he is in a position to supervise the record books, and can also arrange for the ordinary school work to become associated with the club's activities, which helps to bring the school and home life into closer relationship. In this way school tasks become more attractive, and besides advancing the child's knowledge along fresh paths, make the less natural work more agreeable. Frequently children, who, before the association of ordinary school work and club work were indifferent students, have afterwards become enthusiastic and diligent.

A young Ayrshire enthusiast.

It is advisable to establish club meetings for boys and girls. A secretary and president are elected. The secretary would remain in office for an indefinite time, but a different boy or girl should be elected to the chair at each meeting. These meetings serve a dual purpose in that the debates and discussions brought forward advance the knowledge of the children, and also educate them in the conduct of meetings. These meetings, held on strictly formal lines, help to give a sense of social responsibility which is of great benefit to the children in after life.

Objectives and Rules.

A summary of the objects of the clubs and a set of simple rules are given below:—

The object of the clubs is to interest children in the life on the land and to help to equip them to overcome the obstacles they will meet when they commence their work as farmers. Briefly, the advantages are—

1. The work of the school and the home is closely linked because of the practical nature of the club work.

2. Scholars become interested in all branches of farm work and animal husbandry, and, being interested, do not consider the work a drudgery.

3. The stock and poultry are improved by the introduction of pure-bred stock.

4. Better farming methods are introduced and experiments carried out.

5. The child is enabled to test his ability and display any aptitude he may have.

6. The giving of an animal to a child to care for creates an interest and a pride of possession, and, by throwing a responsibility on him, develops pride in his work and a spirit of reliance.

7. Children are taught to keep a complete and accurate record of their work and results, and so a knowledge of bookkeeping is gained.

8. Club work and school work are correlated.

9. A spirit of healthy rivalry and a desire to excel is created. Members are taught to become competent judges of pure-bred stock.

10. Children are given practice in the conducting of meetings, and thus trained to express their opinion in public.

11. Team work is taught, and a spirit of co-operation fostered, which should assist the co-operative movement later in life.

12. A system of education at once practical and scientific is developed, and school work is invested with a reality hitherto absent.

13. A spirit of inquiry is fostered, and members are encouraged to gain a sound knowledge of their work, to carry out independent experiments, and to study a question from different angles, which means a broadening of the vision and renders them better able to meet and deal with difficulties they may be called on to face later in life.

14. The movement caters for the child who, though a logical thinker, may become discouraged and disinterested because of competition with scholars who are naturally better equipped for an academic course of study.

15. A spirit of honesty, industry, and truthfulness is fostered, as well as loyality to each other and to their country.

Following is a set of simple rules suggested for the management of Young Farmers' Clubs:—

1. A Young Farmers' Club shall be formed, and called the.....Farmers' Club.

2. A committee of seven members to be appointed; head teacher to be chairman. (Number may be altered to suit views of meeting.)

3. Meetings shall be held once monthly or twice monthly.

4. The business of the committee shall be to arrange for purchases and delivery of stock, lectures, field days, and conveyance of pupils; also to arrange for the annual show or picnic, and any general club business that might arise.

5. A district club guide or guides shall be appointed to visit and assist the children with advice, and to see that animals are being taken care of by the children. The guide or guides shall report to the chairman as to progress of stock, and shall visit the

place, say, twice monthly, or when directed by the chairman.

6. The ages of club members shall be from 8 to 16. (However, the teacher may use his own discretion as to children of younger age being admitted.)

7. All children must obey the officers of the club, and take reasonable care of their stock, and keep a careful account of expenditure and profit.

8. Children must exhibit their stock at the annual show or picnic.

9. Efforts to be made to obtain trophies for competition by the different clubs and club members.

10. Stock of various kinds may be kept as the children fancy—Poultry, bee farming; home products, to include growing of vegetables, flowers, or cooking. Sewing by the girls may be taken up, and prizes offered for these at the annual show.

11. Fruit growing—Child to carry out all work, such as pruning, cultivating, spraying, &c., and to keep an account of cost and profit. Area not to be less than a quarter of an acre. The growing of any other crops may be taken up.

12. The members shall hold club meetings. A secretary shall be appointed permanently, but a different child shall take the chair at each meeting. Discussions or debates shall be carried out under the direction of the teacher, who shall determine the frequency of these meetings.

13. At the annual show, 50 points shall be the maximum for exhibit, and 50 points maximum for excellence in the keeping of records.

PARENT OR GUARDIAN'S PLEDGE.

I promise to allow to become a member of the Y. F. Club and take up as a project, and that all money earned by $\frac{\text{him}}{\text{her}}$ from this work shall be banked in $\frac{\text{his}}{\text{her}}$ name in the local Savings Bank. That I shall not interfere with $\frac{\text{him}}{\text{her}}$ unduly, and shall not sell $\frac{\text{his}}{\text{her}}$ stock or produce without $\frac{\text{his}}{\text{her}}$ and the club leader's consent.

(Signed)

Date—

MEMBERS PLEDGE.

I promise to obey the rules and regulations and all officers of our Club: To always be kind to dumb animals: To be truthful, honest and loyal to my King and country.

Member's Signature—

President—

Secretary—

Members of the progressive Young Farmer's Club at Scotsburn.

Harvesting Apples

By A. G. Strickland, M.Agr.Sc.,
Horticultural Research Officer.

THE importance of maintaining vigorous, healthy trees and the necessity for regular and thorough spraying to control insect pests and fungus diseases are realized by most orchardists. Each year demands a comparatively heavy outlay for the purchase of manures, implements, spray materials, and other equipment necessary for producing crops of good quality fruit. In view of the expense incurred in producing such crops, it is surprising to find so many growers who fail to give adequate attention to the proper picking of the fruit and to maintaining its quality after it has left the tree.

This applies particularly to the apple during the picking of which every care should be exercised so that the fruit shall keep well in cool store and, in the case of export, arrive at its destination in the best possible condition. By picking at the correct stage of ripeness and by treating the fruit carefully until it is in the cool store or on board ship, the grower will help to avoid losses from poor quality and wasty fruit.

As an apple ripens it passes gradually through a series of changes in composition, colour, texture, &c. Soon after the tiny apple is formed, it commences to store up starchy material, and this process continues for some ten weeks or so. At a later period the apple begins to ripen, and this ripening process involves the transformation of the stored starch into sugar. Thus the fruit becomes progressively sweeter to the taste as more and more starch is converted into sugar. At the same time other changes occur. The pips change from white to brown, and eventually become almost black in the fully ripened fruit. The flesh becomes softer.

The most important change to the grower who is to determine when the fruit shall be picked is the change in colour. In red apples such as Jonathan, Rome Beauty, &c., the skin of the fruit takes up a deep-red colour on the side exposed to the sun. At the same time, however, the unblushed portions of the skin are changing in colour, irrespective of the sun's rays. These unblushed portions, originally green in the unripe apple, become green-yellow, and ultimately almost full yellow in the mature fruit. When judging the time to pick apples less attention should be paid to the red colour, and more to the colour of the unblushed skin, or "ground colour" as it is commonly termed. It is obviously desirable to develop as much red colour as possible, but if this is done at the expense of

leaving the fruit too long on the tree, the keeping quality in cool storage will be affected adversely.

Immature apples naturally will vary in the degree of unripeness. The general characteristics are pale-coloured pips, green ground colour with no sign of yellow appearing, and a preponderance of starch over sugar. Apples picked at such a stage are very liable to wilt and shrivel in cool storage. In some districts varieties (such as Cleopatra), which are subject to bitter pit, seem to be particularly liable to this disease if picked in an immature condition.

For export and storage, apples are best picked at medium maturity, that is when the pips are definitely coloured and the ground colour is beginning to turn yellow. Over-mature fruit is characterized by a distinct yellow ground colour. Fruit picked at such a stage probably will give trouble when exported or cool stored. When marketed it may be over-ripe, and with certain varieties (particularly Jonathan) fruit picked in an over-mature state is particularly liable to breakdown in storage or transit. Jonathan breakdown is characterized by a brown punkiness underneath the skin, which in the early stages may be hard to detect superficially.

As in most things, there is a happy medium in picking apples. Both immature and over-mature fruit are liable to their peculiar troubles. Often over-mature fruit will arrive in Great Britain in apparently good order, but will collapse before it reaches the consumer. On the average, four to five weeks elapses between the arrival of fruit in England and its ultimate delivery to the retailer. Breakdown and other physiological troubles which cause so much wastage in exported and stored fruit, are also related to the size of fruit. In the case of Jonathans and many other varieties, large fruits are very poor keepers, and should not be exported or held in local store for any length of time. In some other varieties, such as Granny Smith, there does not seem to be such a marked difference in keeping quality between large and small sizes.

Although it is highly desirable that fruit be picked at the theoretically correct stage of maturity, it should be remembered that this can be done only approximately. Shipping space is booked ahead, and must be filled; moreover, it is impossible at present to state definitely an exact maturity standard for all varieties. The determination of the stage for picking, therefore, must be left largely to

Picking Apples in a Victorian Orchard.

the grower's discretion. The main necessity at present is to avoid picking excessively unripe fruit, or the deferring of picking until the fruit is definitely over-mature. In an effort to secure that little bit of extra colour, some growers undoubtedly are prone to leave the fruit on the tree beyond the optimum picking stage.

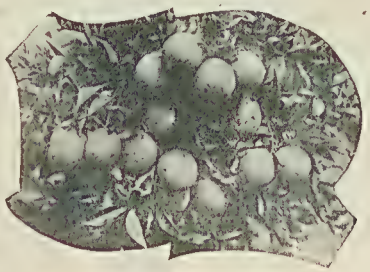
Various tests for maturity have been devised, but none of these is applicable to all varieties, under all conditions. The iodine test shows the extent to which starch has been changed to sugar, but is not a test which could be used in practice for all varieties. The pressure test which measures the degree of softening of the fruit is also unreliable. The best practical guide is the ground colour, and for most varieties picking should proceed when the ground colour changes from green to yellow. In the case of light crops the fruit should be picked earlier—that is when the first signs of yellow appear in the green. Some varieties such as Granny Smith may be picked before the yellowing has become marked.

Having determined that the fruit is ready to pick (and the average fruit-grower should have no trouble in this respect) there is no time for other matters. If left on the trees, the fruit eventually will become unfit to survive a voyage to England, or a period of cool storage locally. Different apple varieties vary in the length of picking period. Some have a short picking period, and if picked when even a little immature or over-mature, may develop storage troubles such as bitter pit or breakdown. Other varieties have the advantage that they may be picked over a longer period. Varieties which are characterized by a long picking period are Granny Smith, Tasma, and Dunn's. Jonathan, Cleopatra, Rome Beauty, and Delicious have a shorter picking range, and should be picked more precisely to the maturity standard.

Much of the wastage in Australian apples sent to the United Kingdom is stated to be due to over-maturity. This may be avoided by picking earlier, but the matter does not end there. Under normal conditions, fruit ripens more slowly on the tree than when held at ordinary temperatures in packing sheds, &c., after picking. In other words, the best place to keep apples, unless they can be promptly cool stored or sent to the ship's side, is on the tree. Much over-maturity and consequent breakdown in susceptible varieties like Jonathan, Delicious, &c., undoubtedly is due to exposure of the fruit to warm temperatures after picking.

During picking and packing, the fruit should be handled with the greatest care in order to avoid damage from bruising. All bruised, rotten, very small, and mis-shapen fruits should be culled, as well as fruit which is affected with black spot or codling moth.

Fruit which is carrying spray residue must be cleaned, and this is best effected by washing in a suitable solvent. Although several solvents are under consideration, dilute hydrochloric acid, preferably warmed to 80° to 90° F. seems to be the most effective residue remover. Quite apart from the spray residue question, washing generally results in greatly enhanced appearance of the fruit. To be most effective, washing should be carried out as soon after picking as practical considerations will allow, and if fruit is to be stored for an appreciable period before shipment or sale, it is highly desirable that it be washed before storing. Owing to the development of natural wax on the skin of the apples, cleaning at a later date may well prove to be a difficult operation.



Irrigated Pasture Competition

Results at Rochester

Report of the Judge,
E. T. Beruldsen, B.Sc., (Agric.

A productive irrigated pasture.

NUMERICALLY the entries in the Rochester competition for irrigated pastures and school plots were disappointing, but this is by no means indicative of a lack of interest in progressive pasture improvement in the Rochester district. Everywhere the writer encountered evidence of an extension of the area being sown down to good quality grasses and clovers, and of improved cultural practices being employed in the older established pastures. Indeed, those with the longest experience of mixed pastures under irrigation are the most enthusiastic about the response which these pastures will make to adequate watering and manuring.

A particularly interesting feature of the tour of inspection was that in numerous instances one found full advantage being taken of the spring flush of growth to conserve fodder in the medium of meadow hay for use in the lean periods. Some excellent samples of meadow hay were noted, and it was encouraging to realize that better management of the pastures was resulting in the elimination of waste of valuable herbage. Subdivision and rotational grazing aid considerably in this valuable practice, as an adequate number of paddocks permits one or two paddocks to be protected from the stock during the flush period, without unduly restricting the grazing area.

Some doubts were expressed as to the best time to withdraw stock from a paddock intended to be reserved for hay, and as to the right time to cut. Undoubtedly the time of shutting up the paddock will influence both the yield and botanical composition of the hay. Experience at the Research Farm at Werribee tends to show that the best time is about the middle of August, and this should apply to the irrigation districts in the north. The grasses, particularly rye-grass and cocksfoot, then get a good start of the clovers, and heavy yields of hay are cut three months later. If the stock are withdrawn later than August the clovers tend to repress the grasses, and although a good quality hay is obtained, much lighter yields result.

As in many irrigated pastures clovers seem to become predominant, and too small a proportion of the grasses is in evidence, the practice of shutting up such pastures for hay in the middle of August would appear sound from the point of view of rehabilitating the grasses. An irrigated pasture at Werribee which had been closely mown at short intervals over a period of two years eventually had a botanical composition of 20 per cent. grass and 80 per cent. white clover, the close mowing favouring the stoloniferous white clover. At the expiration of this period the paddock was shut up for meadow hay in August, 1931, with a subsequent rejuvenation of the rye-grass and cocksfoot. For months after the

hay was taken off the botanical composition was approximately 60 per cent. grass and 40 per cent. clover.

The time of cutting the crop influences the quality of the hay to a marked degree. The grass and clover should not be allowed to reach maturity before cutting, but should be cut at flowering stage while the herbage is still leafy and succulent. Any loss in yield is more than amply compensated for by the much higher quality and digestibility of the fodder conserved. A paddock shut up in the middle of August should be ready to cut by the middle of November or even earlier.

It is not always advisable to cut the same paddock for hay two years consecutively, as the practice has a tendency to open the sward with consequent deterioration of the pasture.

A further development which may be expected in the district is the practice of making grass ensilage. By this means surplus fodder in the flush period and the clippings from what otherwise would become rank patches in the grazing paddocks can be conserved as a valuable fodder in a succulent state.

DETAILS OF AWARD (One Inspection).

Exhibitor.	Lay-out for Irrigation and Condition of Channels.	Condition of Pasture.	Mixture.	Uniformity.	Freedom from Weeds.	Total.
	20.	20.	20.	20.	20.	100.
1. H. A. Schier ..	18	19	20	19	18	94
2. E. Watson ..	19	18	18	18	19	92
3. A. L. Clymo, Exh. 1	18	17	17	18	19	89
4. A. L. Clymo, Exh. 2	18	16	17	18	19	88

A few queries were received as to the advisability of liming the pastures. The expressed intention was to give superphosphate a rest for the time being and devote the money to lime. It can be asserted definitely that the use or lime can never *replace* superphosphate as a manuring practice. Although lime has proved beneficial in certain circumstances, there exists little evidence in favour of its general use. All the results from the accumulated experience of tests at Werribee and in the northern irrigation districts indicate that any benefits derived, at least as regards yield, are not to be compared with those derived from the application of *extra* superphosphate. Also, it has been shown definitely that the calcium content of herbage can be increased by the liberal use of superphosphate in most cases just as much as by the direct application of lime. As yet the possibilities of superphosphate have not been fully exploited, and from an economic standpoint its use in more liberal dressings will give better results than expenditure on lime.

The four entries in the pasture competition were worthy representatives of some of the best pastures in the district in various stages of development. Details of the awards are shown in the accompanying table.

Pastures.

The winning pasture, exhibited by Mr. H. A. Schier, Ballendella, presented a very attractive appearance. This pasture was sown in 1930, and it has improved each year since its establishment. Mr. Schier was not satisfied with the rye-grass in his pasture, it being sparse and evidently not of a truly perennial strain. In August, 1932, after a good harrowing, some Hawke's Bay certified perennial rye-grass was sown while top-dressing. In the following October, at the time of inspection of the pastures in the competition, the experiment showed promise of the success which has been fulfilled this year. A dense sward, with the grasses and clovers well balanced, is now in evidence. Mr. Schier manures liberally with superphosphate, and, since last year's inspection, has applied one bag per acre in January and another bag per acre in September last. The watering method employed is to irrigate approximately once a fortnight with even shorter intervals in hot weather. The sward is exceptionally uniform in appearance, which is no doubt partly due to Mr. Schier's practice of giving occasional harrowngs to break up droppings and obviate any rank patches developing. A paddock adjacent to that exhibited provides a striking testimony to the value of top-dressing in that a good pasture of white clover and rye-grass is developing naturally without these species having been sown.

Mr. E. Watson exhibited a young pasture of 3 acres sown down in March, 1932, with one bag of superphosphate per acre. The mixture recommended by the Department of Agriculture was varied to the extent of including as much as 5 lb. of lucerne per acre. Mr. Watson's objective was to have lucerne the main component in the first few years, and when that thinned out under grazing conditions to have a well-established sward

of grasses and clovers replacing the lucerne. That he will succeed in this objective there is no doubt. At the time of inspection this young pasture was exceptionally good, and while all the species were well represented, lucerne was naturally the most prominent. Since sowing down, the pasture has been top-dressed twice, with 90 lb. of superphosphate in September, 1932, and 1 cwt. in August of this year. Mr. Watson waters his pastures every three weeks and at shorter intervals when possible during hot weather.

Mrs. A. L. Clymo's exhibit No. 1 was a paddock of 6 acres which had been exhibited the previous year. At the time of inspection it was in a meadow condition, and was shortly to be cut for meadow hay. The paddock promised to yield a heavy crop. A good mixture was in evidence, cocksfoot, lucerne and subterranean clover being most prominent, while red clover, white clover, and rye-grass were represented throughout. This pasture is particularly interesting in that it was established by scarifying up an old lucerne stand and sowing the grasses and clovers while top-dressing.

The second exhibit was a young pasture of 4 acres sown down with 90 lb. of superphoshate in March, 1932. Italian rye-grass and subterranean clover were excluded from the usual mixture, but Hawke's Bay certified perennial rye-grass was sown, with the result that a very promising stand of rye-grass was in evidence. Red, Alsike, white and strawberry clovers were generally represented in that order of prominence. Since establishment it has been top-dressed with 1 cwt. of superphosphate per acre in December, 1932, and another 1 cwt. per acre in July of this year.

School Plots.

Four schools entered for this competition as compared with six last year. However, the appearance of the plots reflected the sustained interest of the teachers and scholars in this valuable adjunct to the work of the Young Farmers' Clubs. Again points were allotted for various features, including surroundings, condition of the herbage, purity of the species, labelling, condition of the paths, and freedom from weeds. A total of 60 points was the maximum obtainable.

AWARDS.

1. Nanneella Estate	..	58 points.
2. Ballendella	..	54 „
3. Strathallan	..	51 „
4. Nanneella South	..	50 „

It was unfortunate that the plots were not judged at the time when they would have looked most attractive. The teachers were faced with the problem of either cutting the herbage or letting it grow rank and straggly before the visit of the judge. In either eventuality the plots could not have looked as attractive as if they had been judged earlier.

In small plots of this nature it is difficult to preserve the identity of the various species, as, even in spite of precautions some species, especially clovers and annual grasses, tend to stray into plots of other species. As the great value of these plots lies in their aid to identification and study of the habits of the various grasses and clovers, some confusion might be avoided if plots which have obviously become mixed were dug up and resown with the species they purport to contain. In certain cases this had been done with commendable results.

Potato Growing

(*Continued from page* 18)

12 cwt., and up to 16 cwt. per acre can be sown with advantage. The best class of seed is that which has been selected immature, and which is sprouted. This phase of potato culture has been exhaustively dealt with in previous articles.

Crop and Fallow Competition.

Results at Jeparit.

Report of the Judge, A. B. Hackwell, B.Agr.Sc., Assistant Inspector of Agriculture.

THIRTY-FOUR entries were judged in the crop and fallow competition conducted by the Jeparit Agricultural and Pastoral Society this year. In this district, which lies on the fringe between the Wimmera and the Mallee, the soils vary considerably, ranging from strong black clay loams to light sands. In early spring the crops on all types of land gave promise of returning bumper yields, but the prospects were greatly reduced through prolonged dry weather and hot winds experienced in October and early November. On the whole the crops withstood the adverse conditions better than was generally expected, and at the time of judging it appeared likely that the district yield would be well up to average. On some areas the wheat failed badly, in others the crop had tipped in patches or showed the effects of the dry spell. On the other hand, some splendid crops were to be seen, as evidenced by the fact that the eighteen exhibits inspected in the competition were estimated to return an average of 25 bushels per acre.

The heads in most crops were on the small side, but had filled fairly well, and a good sample of grain was expected. Many crops received benefit from the rains in mid-November, although on a number of paddocks the wheat was too far advanced to gain advantage. Fortunately the bulk of the wheat crops in the district escaped any appreciable damage from the heavy falls later in the season. Over the area inspected in the competition the main damage from these rains was confined to the hay, particularly the wheaten hay, and to standing crops of oats and barley.

Competition Crops.

Fourteen of the eighteen exhibits had been sown with Free Gallipoli, a hardy variety which time and again has shown superior ability to withstand unfavorable weather conditions. This season it did well through the dry weeks of late spring, and stood up satisfactorily in the excessively wet period which followed.

Ghurka was sown in three entries, and it was pleasing to note that this variety is gradually being introduced into the district. For a number of years Ghurka has given the highest average yield in many experimental plots on various soils in the wheat belt, and is recommended for general trial as a variety suitable for sowing in conjunction with Free Gallipoli. Ghurka is a crossbred produced from Gallipoli, Currawa, Indian 4, and Federation. It is a short-strawed, late-maturing variety, and should be sown early in the cropping programme, preferably on clean land. It has the advantage of being markedly resistant to flag smut.

In many districts it is difficult to obtain pure supplies of Ghurka, and farmers desirous of sowing this wheat are advised to procure a few bags regularly from one of the seed-wheat stations and build up their own supplies of high standard seed.

Rance also had been sown in three exhibits. In experimental plots on black land at Longerenong and Salisbury this variety has not done so well as either Free Gallipoli or Ghurka, and has been found to be more suited to the lighter Mallee soils and red loamy land.

In the absence this year of liberal rains over the autumn months a reduced germination of weeds occurred prior to sowing, with the result that the crops contained more rubbish than usual, particularly wild oats and mustard.

Traces of flag smut were common, and in a few crops patches of take-all had developed. A disconcerting feature, however, was that ball smut was present in seven exhibits—in most cases, however, to a small extent only. This disease can be completely controlled by pickling, and its presence in a crop indicates that the pickling had not been carried out with the care and exactitude required. Dry pickling with copper powders is almost general throughout the district. The main advantage of this

method is that dusting may be carried out at any time between harvest and sowing, without detriment to germination. The powder, however, must be evenly applied to the grain at the rate of 1½ to 2 oz. per bushel, and thoroughly mixed so that every grain receives its coating. Most of the powders on the market are of satisfactory quality, and when carefully used at this rate per bushel are effective in combating the disease.

The rate of seeding of the competition crops ranged from 60 to 90 lb. per acre, growers on the lighter soils using 60 to 70 lb. From tests over nineteen years at Longerenong it would appear that year in, year out, no advantage is to be gained by increasing the general sowing over 75 lb. per acre even on strong black land. The dressings of superphosphate applied to the crops shown varied from 60 lb. to 1 cwt. per acre, the average being 77 lb.

THE AWARDS.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of— Weeds.	Absence of— Disease.	Evenness.	Total.
Maximum Points..		**35**	**20**	**15**	**15**	**15**	**100**
Section 1.—100 Acres Open Crop.							
T. Parker ..	Free Gallipoli	32	19	13	13	14	91
W. G. Rodda ..	Free Gallipoli	35	18	13	10	14	90
C. E. Krüger ..	Free Gallipoli	26	18	14	13	12	83
O. G. B. Heinrich..	Ranee ..	20	18	13	12	11	74
Section 2.—100 Acres Crop Grown on Medium Land.							
C. E. Krüger ..	Free Gallipoli	26	18	14	13	12	83
E. B. Semmler ..	Free Gallipoli and Ranee	27	18	13	11	13	82
Section 3.—100 Acres Crop Grown on Light Land.							
J. A. Dalrymple..	Free Gallipoli	32	16	13	13	14	88

The open crop section was won by Mr. T. Parker, of Peppers Plain, with a dense, fairly clean crop of Free Gallipoli grown on heavy, dark-grey loam. The wheat was of high purity, and should return a good yield as, except over a few patches which had been tipped, the heads had filled well. The crop was sown at the end of May with 75 lb. of dry pickled seed, and 85 lb. of super. per acre. on well prepared winter fallow cultivated prior to seeding.

Second place was awarded to Mr. W. G. Rodda, of Tarranyurk, with a crop of Free Gallipoli grown on heavy black and chocolate loam. This entry was expected to return the highest yield of all crops inspected in the district. It was even and of good colour, but unfortunately contained some heads of ball smut. It was "combined" in during the first week of May with 75 lb. of dry pickled seed and 75 lb. of super. per acre. The land had been summer fallowed, then scarified in June, cultivated twice, and harrowed twice. Mr. Rodda used a lighter rate of seeding than usual, which no doubt was an advantage this season.

The winning exhibit in Section 2 (medium land) was grown by Mr. C. E. Krüger on red loamy land. The crop, particularly on the rising ground, had been adversely affected by the dry spring. About one third of the area was badly tipped. It was clean and free from disease except for traces of flag smut. The land had been ploughed in July, scarified in spring, well sheeped, and sown in mid-May with 67 lb. of dry pickled seed and 67 lb. of super. per acre.

Mr. J. A. Dalrymple's exhibit in section 3 (light land) consisted of a splendid crop of Free Gallipoli extending over a ridge of red sandy loam. It was very even, well developed and high yielding, but points were lost for the presence of barley and strangers. The land was cropped in the second week of June with 65 lb. of formalin-pickled seed and 75 lb. of super. per acre.

Competitor.	Variety.	Yield.	Purity and Type.	Absence of— Weeds.	Absence of— Disease.	Evenness.	Total.
Maximum Points..		**35**	**20**	**15**	**15**	**15**	**100**
Section 4.—50 Acres Crop on Fallow Judged 1932—Light Land.							
G. T. Werner ..	Ghurka and Ranee	34	17	13	11	13	88
A. Twartz ..	Free Gallipoli	30	19	13	11	13	86
A. T. Haursler ..	Free Gallipoli	26	18	13	10	14	81
Section 5.—50 Acres Crop on Fallow Judged 1932—Medium Land.							
L. R. Rodda ..	Free Gallipoli	33	18	13	14	14	92
W. T. Rodda ..	Free Gallipoli	28	19	13	13	14	87
J. A. Dalrymple..	Ghurka ..	30	17	11	14	14	86
C. Hand ..	Ghurka ..	28	16	13	14	14	85
E. B. Semmler ..	Free Gallipoli	28	18	13	11	13	83
F. H. Schulze ..	Free Gallipoli	18	18	12	13	12	73
Section 6.—50 Acres Crop on Fallow Judged 1932—Heavy Land.							
W. G. Rodda ..	Free Gallipoli	32	19	13	13	13	90
A. T. Polack ..	Free Gallipoli	31	18	11	13	12	85
T. Parker ..	Free Gallipoli	25	19	10	12	11	77

Mr. G. T. Werner, of Jeparit East, won the light land section with a heavy yielding crop of Ghurka and Ranee grown on a flat consisting mostly of reddish sandy loam. The bulk of the Ghurka was dense with well-filled ears. The Ranee had stooled well, but the heads were on the small side. The crop was fairly free from weeds, but showed a slight infection of ball smut. The fallow had been ploughed in July, harrowed three times, scarified in August, and cultivated with the spring-tooth in November, January, and April. The crop was sown in mid-May with 68 lb. of dry pickled seed and 60 lb. of manure per acre.

In Mr. A. Twartz's exhibit half the area which had been sown in the first week in May carried a particularly heavy, tall, and well-filled crop far superior to the balance which had been sown a fortnight later. The seed (dry pickled) was of a high standard of purity, and had been sown at the rate of 60 lb. per acre with a similar quantity of superphosphate. Several patches of take-all had developed, and an odd head of ball smut was present. The paddock had been ploughed in June, skim-ploughed in August, harrowed, spring-toothed in October and January, and finally worked over with heavy harrows prior to cropping.

In Section 5 (medium land) the winning crop was shown by Mr. L. R. Rodda, of Tarranyurk. The entry extended along rising land consisting mostly of brownish loam. The crop was well headed, even, and free from disease. The area had been scarified in April, August and September, spring-toothed in November and May, and sown at the end of May and early June with 90 lb. of dry pickled seed and 1 cwt. of super. per acre, and harrowed about a week later.

In Mr. W. T. Rodda's entry, the heads, though small, had filled well. The crop was true to type, and very even. The soil, a brownish loan, had been ploughed in July, harrowed twice, scarified, and finally spring-toothed in April. It was sown early in May with 90 lb. of dry pickled seed per acre and a similar quantity of superphosphate.

Section 6 (heavy land) was won by Mr. W. G. Rodda with a crop on strong, black and chocolate, crab-holey ground. The entry had been sown in the second week of May with 75 lb. of dry pickled seed and 75 lb. of super. per acre. The seed was very pure; many heads showed 3 grains in some spikelets, and a good yield was indicated. The land had been ploughed in July, harrowed, scarified in August, harrowed and sown without further cultivation.

Mr. A. T. Polack's exhibit was sown at the end of June with 77 lb. of seed (formalin pickled) per acre, and a similar amount of super. The fallow was worked over twice before cropping, and harrowed afterwards. This crop showed effects from the dry spring —many heads were caught in the flag and others were blighted, particularly in the crab holes where the growth was thicker. An early sown strip at the edge of the paddock was much superior to the bulk of the crop.

The Fallows.

In order to cater for the varying soils throughout the district, the fallow competition is divided into sections for light, medium, and heavy land. Fifteen fallows were entered this year, and in most cases there was little difficulty in classifying the land, though a few entries were on the border line between two sections.

All exhibits in the light land section had been winter fallowed, whereas the bulk of the entries on heavy and medium land were summer fallowed.

On the whole the fallows were in good order, and it was evident that advantage had been taken of the early spring rains to give prompt cultivation to kill the weeds in the young stages and work down the land to a fine tilth.

The importance of efficient weed control on the fallow cannot be too strongly stressed, as weeds growing on the fallow are continually robbing the soil of the moisture and plant food being stored for the subsequent crop. In some paddocks heavy rains in mid-November had packed down the soil, but in the majority of cases the exhibits had been worked over with harrows or cultivator after the rains. A showery day during judging held up the work, but after a short interval it was found practicable to proceed and complete the full programme. All exhibits were awarded maximum points for moisture.

Mr. W. A. Waller, of Lake Hindmarsh, had the best exhibit in the light land section. It was practically free from weeds, and showed a splendid mulch over a compact, level seed-bed. The soil was even throughout, and consisted of red sandy loan with a red clayish subsoil. The area had been ploughed from

[*Continued on page 42.*

Making Cheddar Cheese

By G. C. Sawers, Cheese Expert

Milling the Curd.

THE first and most important consideration in cheese-making is that the milk used be sweet, clean, and sound. Failing this, the result will be an inferior product, particularly in regard to flavour. It is, therefore, a duty of the factory manager to educate his suppliers on the need for supplying sweet, sound milk, and on the methods of handling and treating the milk so as to ensure it reaching the factory in that desirable condition.

Another important factor in the manufacture of a clean-flavoured cheese is the use of a clean, sound lactic-acid starter, which has the effect of overcoming any foreign bacteria in the milk. Conversely, a weak or over-ripe starter may allow the development of fermentation-producing bacteria which become incorporated in the curd and, subsequently, in the cheese. The fermentation thus set up becomes evident by the cheese "opening up" in the curing room. If the temperature in the curing room is high, this trouble is accentuated.

From the time the starter is added until the addition of the rennet the milk is said to be ripening, and the lactic acid producing bacteria are at work. When the milk has gained sufficient acidity the rennet is added. On this correct degree of acidity depends, to a large extent, the quality of the finished cheese.

The use of a good reliable brand of rennet is of importance in producing a proper body and texture in cheese, as it gives the proper curd structure on which to base the subsequent operations. The quantity of rennet to be used depends on various factors, chief of which are the condition and quality of the milk and the time of year. Usually from 3 to 4 oz. rennet per 100 gallons of milk will be found sufficient for ordinary use, although at times where milk is produced from cows depastured on land deficient in lime or phosphates a greater amount is necessary. Over-ripe milk and milk of high butter-fat content also require more rennet.

It sometimes happens that rennets are supplied over standard strength, but this is due entirely to the manufacturer's desire to ensure a rennet of uniform strength reaching their Australian agents. Before application dilute the rennet with eight to ten times its own volume of cold water, and pour evenly over the whole surface of the milk, which then should be thoroughly stirred for from three to five minutes to ensure even distribution, the temperature of the milk at this stage being 84 to 86 degs. Fahr. If the rennet be added too soon, coagulation will be slow, while if too late the process will be hastened, and the cheese will work quickly.

Cutting the Curd.

The curd is ready for cutting when it will split with a clean fracture under the strain of

the index finger inserted into the curd and raised to the surface, or when it will leave the sides of the vat clean when pressed away with the back of the hand. Cutting is performed to facilitate the further contraction of the casein, and the expulsion of the whey. The curd is cut into cubes of about three-eighths of an inch.

The fat is retained in the cheese by being enclosed in the meshes of the casein, and in the breaking up of the mass of casein some fat globules are always set free. It therefore is necessary that care be taken in cutting and subsequent handling of the curd to reduce the loss of fat by this means.

The best results in expelling the whey from the curd are obtained if the curd is cut as soon as it has coagulated sufficiently to maintain its form. After it is cut the whey begins to escape, and the curd sinks to the bottom of the vat. The curd should be stirred gently with the hands for ten to fifteen minutes before any heat is applied. This is necessary to keep the particles well apart and prevent the formation of lumps.

The first test after setting may be made as soon as the cutting is completed, or before the steam is turned on in the vat. If the vat is working under normal conditions, it should show from 0.13 to 0.14 per cent. lactic acid, which represents two-thirds of the acidity of the milk at setting. This is due to the casein of the milk being in the cube rather than in the serum. It has an acid reaction, and, therefore, leaves the serum showing less acidity.

Cooking the Curd.

For the manufacture of a good-bodied cheese it is essential that cooking be done properly. Cooking the curd in the whey at temperatures which are too low, and heating the curd in the whey too rapidly, must be avoided, unless soft curd is to result. The proper heating and firming of the curd in the whey are of considerable importance in the production of a close textured cheese, as the success of the matting or cheddaring of the curd depends largely on these factors. If the curd be improperly cooked and poorly cheddared, the whole object of making the cheese by the cheddar method is lost, that is, a curd will be formed containing less moisture and with characteristic body and texture.

Another suitable time for testing the acid content of the curd is just after the cooking temperature has been reached, which is usually about $1\frac{1}{2}$ to $1\frac{3}{4}$ hours after setting. The same rule holds good here, and the percentage of acidity obtained must be compared with previous tests and with the corresponding tests on the previous day. These, and all influencing conditions, must be taken into consideration to arrive at an intelligent decision.

If on testing the whey shortly after the cooking temperature is reached, it is found necessary to remove a part of it, the acidimeter cannot be used with the same certainty as a test for dipping. This is probably the most critical stage in cheese-making, and it is at this particular point that most errors are likely to occur. Since the whey inside the cube is more acid than the whey outside, the percentage of acidity that should be shown by the whey at dipping depends on the proportion left in the vat during the firming process. If, under these conditions, dipping occurs in from $2\frac{3}{4}$ to 3 hours after setting,

Salting the Curd.

Cheddaring the Curd after Cutting in Oblong Blocks.

the acidimeter usually will show about 0.01 per cent. less than the milk tested at setting.

A mistake in drawing off the whey is almost sure to affect the finished article. If drawn off too soon, or before the proper degree of acidity has been reached, the curd will retain too much moisture, and the cured cheese will grow sour in flavour and be soft and pasty in body. If drawn too late, the cheese will become brittle and mealy in texture, and the flavour may be strong and acid.

The drippings from a fairly well-cooked curd from milk to which a proper starter has been added, should show from 0.22 per cent. acidity before curd is stacked on the sides of the vat, and immediately the curd is piled, if dry, it should test 0.28 to 0.30 per cent. acidity in 2½ to 3 hours after setting the vat. The exact percentage necessary, of course, will depend on the starter in regard to vitality and firmness of the curd, and the cooking temperature.

A canvas cover supported by laths crosswise on the vat is placed over the top to maintain even heat while the curd is cheddaring, a process which takes from ten to twenty minutes. For best results a temperature of 94° or 95° C. should be maintained. The curd is then cut into blocks 4 to 6 inches in width and turned over, the process of turning being repeated every fifteen or twenty minutes. The time occupied may vary from one and three-quarters to two hours, according to the rate of acid development and the quantity and texture of the mass, which, when split, should be leafy, somewhat like the meat on a chicken's breast. Acidity of drippings should be 0.65 to 0.70 per cent. and temperature of curd 94° Fahr.

Knife mills should be used giving a clean, even cut, ⅜ to ½ inch in size. If smaller they are liable to injure the texture of the curd and cause unnecessary loss of butter-fat.

After the milling is completed the curd should be turned over by hand, and covered to maintain the heat and prevent it from bleaching. Repeat the process every fifteen minutes for one hour after milling. The turning of the curd reduces the temperature, and allows of aeration which assists in disposing of taints and gases. Fifty minutes after milling, a small hole should be made in the centre of the curd to allow a sufficient quantity of free moisture to gather to enable a test to be made. Aim at 1 per cent. acidity three hours after the curd is dry on the sides of the vat. Again, turn the curd over by hand and cover up, repeating the previous process of mellowing. In half to one hour the curd becomes soft and velvety, and exudes a moisture of which half is composed of fat and whey, and tests 1.05 to 1.15 acidity. The curd is then ready to salt.

Salt is added at the rate of 2½ lb. per 100 lb. of curd for spring cheese, and up to 3¼ lb. per 100 lb. for cheese manufactured from milk rich in butter-fat. Should the temperature of the curd at this stage be 88° Fahr., let the water run from under the vat, and turn the curd

evenly over the bottom of the vat. Sieve half the salt on the curd, and stir up thoroughly from the centre of the vat, leaving a clear space between the unturned curd. The remainder of the salt should then be put on and also mixed. Pile the curd up in the centre of the vat so as to allow the whey to escape. During this operation the temperature will fall 3 or 4 degrees, and should not exceed 84° Fahr.

Cover the curd for twenty minutes, or until the harsh feeling caused by the salt disappears, then mix by hand, after which it will be ready for the hoops. For this operation the most important points to be observed are that an even temperature be maintained, and that the curd be firmly and evenly packed and weighed before being placed in the press. High temperatures at hooping are undesirable, and frequently cause a loss of fat in the pressing, while low temperatures usually are conducive to unsatisfactory pressing, or the appearance of too many mechanical holes in the cheese. When filling the hoop it is advisable to place the same amount of curd in each, so that the cured cheese will be of even size. Pressure should be applied gradually to allow the whey to escape, otherwise, if applied too heavily at first, the whey becomes locked in, causing impairment of the cheese. The screw at first should be brought to bear on the hoops, and given a few turns until the whey comes away freely. Leave for ten or fifteen minutes, and again screw up. Repeat this process for one hour.

A quarter of an hour after the cheese is placed in the press, three or four buckets of hot water, the temperature of which is not to exceed 130° Fahr., should be poured gently over the hoops. Repeat a quarter of an hour before dressing the cheese.

After about one hour has elapsed remove the cheese from the press, when the operation known as dressing the cheese takes place.

Cheeses removed from the press should be carefully examined on the following afternoon, and any faults in regard to finish rectified before they are removed to the maturing room to ripen.

A tendency of some makers is to allow too much moisture to accumulate in the curd when piling it on the sides of the vat. This results in over development of acid. Milling the curd in one and a half hours and salting too soon are other faults. If curds were given more time at this stage, the cheese as a whole would be much closer in texture and more uniform in make.

Common faults such as unclean flavours, sourness, excessive acidity, weak body, pastiness, acid cut, soured in the whey, sufficient to spoil or whiten the colour, &c., can be remedied by the maker, but it is necessary that every detail in connexion with the process of manufacture be carried out carefully and scientifically, if good results are to be obtained.

As previously stated, it is essential to the production of first class cheese that the milk used be clean and wholesome. Milk allowed to remain uncooled and unstirred in hot weather becomes clotted by the cream that rises and toughens on the surface, a condition not conducive to the best results in cheese-making. Cleanliness both inside and outside the factory should at all times be observed, and milk should be obtained only from those suppliers who maintain the same strict standard.

The Cool Storage, Handling and Ripening of Pears

By G. B. Tindale, B.Agr.Sc., Cool Storage Research Officer, Department of Agriculture, Victoria, and S. A. Trout, M.Sc., Ph.D., Section of Food Preservation, Council for Scientific and Industrial Research

The work on which the following paper is based has been carried out under the general direction of the Advisory Committee on Fruit Cool Storage Investigations. The committee consists of representatives of the C.S.I.R. and of the Victorian Department of Agriculture, and was appointed to co-ordinate the activities of these two organizations. The personnel of the committee is as follows:—W. J. Young, chairman, and J. R. Vickery, representing the C.S.I.R.; D. B. Adam, and F. M. Read, hon. secretary, representing the Victorian Department of Agriculture. The actual work is being carried out by the authors of this paper, Messrs. G. B. Tindale and S. A. Trout, at the Experimental Chambers, Government Cool Store, Victoria Dock, Melbourne, and at the Department of Biochemistry of the University of Melbourne.

AS large losses have been incurred in the storage and transport of pears, a general survey of the problems associated with the storage and handling of this fruit was deemed essential. Experiments were commenced in 1932, and are still in progress, but it is felt that certain information now available may be of value to growers and shippers of pears.

It is generally recognized that all fruit has a definite length of storage life, chiefly influenced by (*a*) its maturity at time of picking, (*b*) the conditions of handling between time of picking and storing, and (*c*) the temperature of storage. These factors will be discussed more fully during the course of this article.

Length of Storage Life.

In the past we have regarded the length of storage life as the time taken for the fruit to reach a point where scald (blackening of the skin), core breakdown (a softening and blackening round the core), or mould appears. In some cases these troubles appear after the fruit has ripened, and they therefore represent stages of over-ripeness. In other cases, however, they mark the end of the storage life of fruit which has not passed through a stage of over-ripeness. It must be clearly realized that there are many fruits which change colour in cold store, and come to the end of their storage life without having passed through a ripening stage. There are many changes other than that of colour associated with the ripening process. To allow the tissues to soften and thus produce a juiciness of the flesh, a certain maturity of the fruit and a suitable temperature for ripening are required. This temperature and stage of development of the fruit may vary from one variety to another. Thus, for example, bananas require a temperature of 66° F. to bring about normal ripening.

Experiments have shown that the optimum ripening temperature for William pears is between 55° and 65° F. At temperatures below this range the fruit fails to ripen normally, remains hard, and develops core breakdown and scald. Other varieties of pears, e.g., Packham, Bosc, and Nelis will ripen at lower temperatures, but take about ten weeks to ripen at 45° F. compared with eight days at 65° F. With these varieties the use of the higher ripening temperature of 65° would be of great practical importance in the marketing of such fruit.

It has been mentioned above that ripening is dependent also on the condition of the fruit. Just as very immature fruit will not ripen normally, so fruit which has been in cool store for a long period will also fail to ripen.

Storage experiments have shown that William pears picked when hard, dark green, and

of export size, and immediately stored at 32° F., will ripen normally on removal from store to a temperature of 55 to 65° F., provided that the storage period at 32° F. has not exceeded about twelve weeks. On the other hand, pears after, say, thirteen weeks storage at 32° will not ripen at any temperature, but will become mealy and devoid of flavour. On removal from store at a still later date they will develop core breakdown and scald.

In store at 32° core breakdown and scald do not develop in William pears till after approximately twenty weeks' storage. Thus, while the actual length of storage life at 32° F. is twenty weeks, the fruit must be removed eight weeks prior to this to ripen properly and to be of marketable value.

Colour Changes.

The colour of the fruit is perhaps of greatest value as a practical guide to the point at which William pears should be removed from cold store for normal ripening to ensue at the optimum ripening temperature. The fruit changes in colour in cold store from dark green through light green and green yellow to yellow. It has been found that the appearance of the first sign of yellow marks the end of the commercial storage life of the fruit, for fruit stored beyond this period will not ripen normally on removal from store, but will develop mealiness, core breakdown, and scald.

Loss in Over-stored Fruit.

Core breakdown, mealiness, and scald have been regarded in the past as obscure diseases, but they can now be regarded as normal changes associated with the last stages in the life of the pear.

This has been verified by both storage and respiration experiments. When fruit is picked it is still a living organism, and throughout its storage life it continues to respire, i.e., take in oxygen and liberate carbon dioxide. During this process it is using up the material stored up during growth, and the rate at which it respires is a measure of the rate at which it is using up this stored matter. The daily output of carbon dioxide of pears stored at 32° F. has been collected and measured. It has been found that, up to the green yellow stage, the daily rate of respiration increases until it attains a maximum. Then the rate falls rapidly until the fruit ceases to liberate carbon dioxide at all, and is therefore no longer a living organism. The onset of death is marked by the appearance of scald and core breakdown. Thus all fruit which has passed the green yellow stage is on the downward drift, and the effect of removing such fruit from store to higher temperatures is to hasten its progress towards extinction.

Factors Influencing Storage Life.

Having shown that twelve weeks is the maximum time William pears can be stored and ripened normally on removal to 55 to 65° F., we must now consider those factors, to which previous reference has been made, which influence the length of storage life. It must be stressed that the maximum length of storage life will be obtained only by a close adherence to these factors.

1. *Picking.*

The fruit should be picked when hard, dark green, and of export size. Experiments to date have indicated that there is a fairly wide picking range available. Small immature pears which will not develop quality, and those showing the slightest trace of yellow should be avoided.

2. *Pre-Cooling.*

After picking, the pears, particularly in warm weather, will ripen quickly if not promptly cooled. The practice of prompt cooling is termed pre-cooling. If, during hot weather, pears are left about in the orchard after picking, they will become fully ripe in about six days, after which, of course, they will have no cool storage life.

If they are left for three days they will develop a condition of part ripeness and the cool storage life will be considerably reduced. In the case of the William variety, its cool storage life consequently will be reduced from the maximum of twelve weeks at 32° F. to about six weeks, a period insufficient to allow of successful export. Even one or two days before pre-cooling will materially affect their ripeness when placed in store, and consequently their storage life will be seriously reduced. Lack of pre-cooling, probably more than any other single factor, has brought about many of the losses so frequently experienced in exporting this class of fruit.

3. *Packing.*

When cooled the pears should be packed. It is advisable to pack after cooling for three

reasons: (*a*) packing before pre-cooling means a delay which may run into days, and seriously jeopardize the chances of successful export; (*b*) wrapped and packed fruit takes much longer to cool down than loose fruit, and (*c*) after cooling fruit shrinks, so fruit packed when hot may become loose in the case when subsequently cooled.

4. *Transport.*

The pears should remain in the cool chamber until the ship is ready to lift them. They should then be promptly forwarded to the ship in an iced truck, and carried overseas at a temperature of 30 to 32° F. At temperatures below this there is grave risk of freezing the pears, the freezing point being about 28 to 29° F. At temperatures above 32° F. the storage life of the fruit is considerably reduced, e.g., the length of storage life at 36° is only half of that at 32° F. Accurate control of temperature is of greater importance in the storage of pears than in the storage of apples, for the length of storage life of the former is relatively short as compared with that of the latter.

5. *Marketing.*

Australian pears arrive on overseas markets at a time when the prevailing atmospheric temperatures are well below that required for the best ripening conditions, and in consequence best quality cannot be developed. It is felt that some provision should be made for ripening pears, particularly the William variety, on arrival in England. This would be a similar practice to that adopted in the banana trade, where the fruit is shipped green and ripened on arrival. These remarks apply almost as strongly to the marketing of William pears in Melbourne during the winter months.

6. *Variety.*

Throughout this article attention has been directed chiefly towards the William variety, but the same remarks apply to other varieties, except that most other varieties are later maturing and have a longer cool storage life. Some late maturing pears have a cool storage life, from a marketing point of view, of six months. In general, the length of storage life of pears is proportional to the time taken for the fruit to reach maturity on the tree.

Hoary Cress Control

(*Continued from page 6.*)

food, and partly to the fact that cultivation is dispensed with for a long period. It is understood, of course, that the lucerne or pasture is adequately watered and manured, and subjected to correct grazing management.

While the *control* obtained by this method is good, and sufficient for all practical purposes (excepting where such lucerne is intended to be sold off the farm), no *eradication* is accomplished. If the field is ploughed up subsequently a luxuriant growth of hoary cress is the inevitable result. Where practical considerations permit, the sowing down of such crops will effectively force the weed "under cover" and prevent its rapid encroachment on clean areas. As a control method, it has the advantage of being immediately productive, while the outlay on herbicides and cultivation cannot be expected to give any immediate financial return.

Summary.

Large areas, at present, cannot be dealt with by any method of eradication, in view of the expense entailed, and only ameliorative measures designed to prevent damage to crops in the early stages are suggested.

Small patches may be eradicated on dry-farming land. Cultivation, or hoeing, persistently and regularly carried out is the most reliable method. Where the subsoil is permeable, salting or carbon bisulphide may be used successfully. Arsenical sprays may be used successfully, but may not be expected to give complete eradication under dry conditions of weather and soil. A recent development is the acid sodium arsenite spray as an alternative to the arsenic pentoxide spray previously recommended.

The sowing down of lucerne and pastures in irrigated areas, if accompanied by correct practice in regard to watering and manuring, enables a good control to be obtained without loss of productivity.

The use of herbicides in orchards is not recommended, owing to the risk of damage to the root system of the trees.

Orchard and Garden Notes

By Edward E. Pescott, F.L.S.

Carnations.

The Flower Garden.

JANUARY is always a busy time in the garden. Dahlias should be watered and manured; and as the plants grow they should be tied to the stakes, so as to protect the brittle stems from wind. As Chrysanthemums grow, they should also be tied to stakes. These plants must not be forced too early; it is first necessary to produce strong, stocky, and sturdy plants. Manuring can follow later.

Carnations should now be layered, by cutting the stems one-quarter way through at the base, and hilling the plant around with light soil or sand. The layers should have rooted and be ready to plant in three or four weeks. Carnation cuttings may also be set; the cutting should be well trimmed at the base, and the tops of the leaves cut off. Sandy soil should be used as a medium for striking the cuttings, which must not be overwatered.

Seeds of Winter Sweet Peas, Antirrhinum, Iceland Poppy, Cineraria, Primula, and similar winter-flowering plants should now be sown. Early sowing and early-matured plants, will give ample flower displays all through the winter.

Rose bushes should have their old flowering heads and weak stems cut away, and the roots should be given a good mulch of grass or stable manure.

The Orchard.

This seems to be a year of pests. Codling moth is certainly very prevalent. In one large Southern orchard, up to the first week in December, the grower had captured eight thousand moths in the lures. Only constant vigilance will enable the grower to cope with the pest this season. The spray must be effective, and spreaders of some kind should be used. The health regulations regarding arsenical and lead residues should not be forgotten; and the use of spreaders, and oil spray mixtures in the later sprays, should be followed.

Where chemical bands have been used, it is necessary to see that the old bark has been well scraped off. The bands do not attract the larvae, they provide a hiding place, and if a similar hiding place is provided by bough and loose bark, there is no guarantee that the chemical bands will be 100 per cent. efficacious.

Pear and cherry slug has been worse this year than for many years. This pest is easily controlled where arsenical sprays are applied, especially to pear trees, but in many country districts there are numbers of hawthorn hedges—a favourite host for the slug—and these should be sprayed as well as the pear trees.

In citrus districts, growers should prepare at once for an attack on the red scale of orange and lemon.

The Vegetable Garden.

Asparagus beds should be manured now, and kept well watered all through the growing period: By this means a good strong crown will be made, which will give ample stems next spring.

Celery plants should be set out, either in the level beds or in trenches. The soil should be very rich for celery culture. The trench system

of growing celery is now superseded in many places by surface culture, and the plants are grown in crowded rows, and both watered and manured very freely. When the time for blanching arrives, the bed is surrounded with boards, old linoleum, old strong duck canvas, or some such material. Blanching should occupy from eight to eleven days. If celery leaf rust appears—a fungus which shows as brown spotting on the foliage—the bed should be sprayed with the lime-sulphur spray.

Seeds of cabbage, sprouts, cauliflower and, similar plants should be sown in open sunny beds, a poor soil should be used. Seeds of carrot, parsnip, and turnip may be sown in rows for early crops. These plants delight in a rich soil, which has been deeply dug right down to the full depth of the spade.

Jeparit Crop and Fallow Competition

(*Continued from page* 33.)

grass in early June, and harrowed, scarified in August, harrowed in September, scarified in October, and spring-toothed in the third week in November.

Second place was gained by Mr. H. R. Janetski, of Jeparit East. The paddock, which was clean, with a level bed and a good layer of mulch, had been ploughed from grass in June, harrowed, and spring-toothed in July, August, September, and early December.

The awards for the fallows are as follow:—

Competitor.	Moisture.	Mulch.	Absence of Weeds.	Cultivation.	Total.
Maximum Points	**25**	**25**	**25**	**25**	**100**
Section 7.—50 Acres Fallow—Light Land.					
W. A. Waller	25	24	24	23	96
H. R. Janetzke ..	25	23	24	23	95
G. T. Werner ..	25	23	23	23	94
C. Hand ..	25	23	22	22	92
A. Twartz ..	25	22	20	22	89
J. A. Dalrymple ..	25	22	20	21	88
Section 8.—50 Acres Fallow—Medium Land.					
G. Broadbear ..	25	24	23	23	95
E. B. Semmler ..	25	23	24	22	94
T. Parker ..	25	23	23	22	93
W. S. Broadbear..	25	23	22	22	92
A. T. Hauesler ..	25	22	22	22	91
Section 9.—50 Acres Fallow—Heavy Land.					
T. Parker ..	25	24	24	23	96
A. T. Polack ..	25	24	23	23	95
W. G. Rodda ..	25	23	22	23	93
L. R. Rodda ..	25	22	23	22	92

A splendid fallow entered by Mr. G. Broadbear, of the Lake district, won the medium land section. The paddock of red and greyish loam interspersed with crab holes, had been out for grass, and was summer fallowed with a sundercut in February-March, scarified early in July, harrowed in July and August, spring-toothed in September and October, and harrowed in November.

Mr. E. B. Semmler, of the Lake district, came second. This fallow was also in good order, being very clean with the mulch even, but slightly on the shallow side. The land was scarified in March from barley stubble, scarified again in June and August, combined in September, and harrowed in November. It consisted mostly of chocolate loam, with a few crab holes.

The heavy land section was won by Mr. T. Parker, whose fallow showed a good mulch with fairly level bed, and was practically free from weeds. It was an even piece of ground which had been summer fallowed in March, scarified in June and August, harrowed, combined and harrowed in September, and harrowed again in November.

Mr. A. T. Polack's entry had been worked down well, and the bed was level and consolidated. The area consisted mostly of black clay loam and reddish loam with a strong subsoil. It had been scarified in April and early July, half combined in September, and the balance scarified in October, the whole being combined late in October, and harrowed in November.

Artificial Fertilizers Registered for 1934

Analyses and Unit Values

By W. C. Robertson, Chemist.

THE Victorian Fertilizers Act, which was passed in 1904 to control the quality of artificial fertilizers, has since been amended in such a way that the sale of this essential farmers' commodity is now firmly regulated by the Department of Agriculture.

Before any artificial fertilizer is offered for sale in the State a brand must be registered at the office of the Director of Agriculture. Failure to comply with this section of the Act renders the manufacturer or vendor liable to a penalty of not less than £10 for the first offence and of not less than £100 for any subsequent offence. No brand is registered unless the fertilizer it represents is of fair quality and reasonable commercial value.

It is compulsory for the seller to brand every bag containing the fertilizer with the registered brand, and also to see that a label is affixed guaranteeing the net weight in pounds and the percentages of plant foods contained in the fertilizer. The name and address of the manufacturer and the registered brand of the fertilizer also must be set out on the label.

At the time of sale or before delivery of the fertilizer, or any part of it, an invoice certificate or warranty signed by the vendor or his agent must be given the purchaser stating—

(*a*) the name and place of business of the vendor;

(*b*) the registered brand of the fertilizer;

(*c*) the quantity of the fertilizer comprised in the sale; and

(*d*) a chemical analysis guaranteeing the quality of the fertilizer in a similar manner to that on the labels attached to each bag.

Any infringement of the sections of the Act dealing with the labelling of bags or the giving of invoice certificates renders the vendor liable to prosecution.

The farmer when purchasing his artificial fertilizer requirements for the season will therefore note—

(1) that the fertilizer must have a registered brand,

(2) that a label guaranteeing the fertilizer must be affixed to every bag, and

(3) that an invoice certificate must be in his possession before the fertilizer he has purchased is delivered.

If these requirements are not complied with the fertilizer may not be worth the carting. Apart from this, the farmer should remember that he is personally responsible to the Department for the production of the invoice certificate on demand, and that there is a penalty under the Act for non-compliance.

On more than one occasion in recent years inspecting officers of the Department have been inconvenienced in their inquiries through failure on the part of purchasers to produce the invoice certificate received in connexion with the purchase of artificial fertilizer.

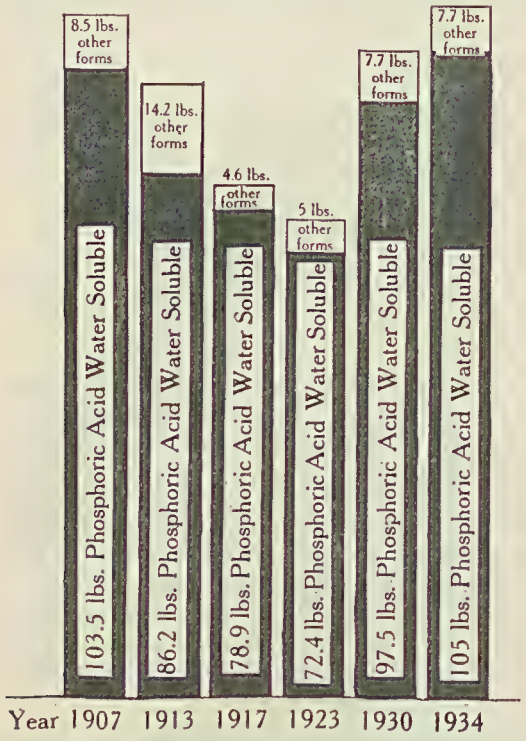
Net Weight.

Although the net weight of fertilizer contained in each parcel is guaranteed on the label which is attached to each bag, it does not necessarily follow that the bag contains the stated number of pounds of fertilizer. Particularly is this so in the case of superphosphate.

This fact is due to loss of moisture during transit, and it can readily be understood that the loss will depend largely upon the climatic conditions during transport and storage.

Superphosphate is largely used in the hay and grain growing and grazing districts of the State, and to avoid the inconvenience and loss caused by transporting the fertilizer over bad roads, it is generally consigned during the heat of the summer months. Another factor

is the policy of back loading. The fertilizer contains between 8 and 10 per cent. of moisture when it is loaded at the factory, but as it may be a few days in arriving at its destination an appreciable amount of this moisture is evaporated, and in some instances the loss has been known to equal 6 or 8 lb. per bag.


8.5 lbs. other forms
14.2 lbs. other forms
4.6 lbs. other forms
5 lbs. other forms
7.7 lbs. other forms
7.7 lbs. other forms
103.5 lbs. Phosphoric Acid Water Soluble
86.2 lbs. Phosphoric Acid Water Soluble
78.9 lbs. Phosphoric Acid Water Soluble
72.4 lbs. Phosphoric Acid Water Soluble
97.5 lbs. Phosphoric Acid Water Soluble
105 lbs. Phosphoric Acid Water Soluble
Year 1907 1913 1917 1923 1930 1934

Graph 1. Showing the number of pounds of phosphoric acid received for every 20s. expended on superphosphate during the period 1907-34.

However, the loss of weight is of little importance, providing the net weight guaranteed is correct at the factory. When the farmer purchases a ton of superphosphate (or any other fertilizer for that matter) he is purchasing a given amount of plant food. Any loss in weight which is due to evaporation of moisture during transport or storage will be offset by a consequent increase in quality, which means that a ton of 22 per cent. superphosphate may be converted into 19 cwt. of superphosphate containing 23 per cent. phosphoric acid. Therefore, weight on delivery is controlled more or less by the analysis of the fertilizer.

Unit Values.

From the results of the analyses of the simple fertilizers set forth in the application for the registration of brands, the chemist of the Department of Agriculture computes "unit values" annually.

The "unit value" is the commercial value of 1 per cent. of nitrogen, phosphoric acid, or potash in their respective forms in one ton of fertilizer.

While a calculation based on the unit value may not give the current price per ton of any given fertilizer, it provides the farmer with a very useful and simple method of ascertaining comparative values between fertilizers of similar composition.

It should be remembered that unit values are the commercial values based on the average registered prices for simple fertilizers, and are not agricultural values fixed by the Department of Agriculture. In some instances and at certain periods the ruling prices for tankage fertilizers such as blood and bone, &c., do not coincide with the prices which are registered, and in these cases it is always advisable to obtain several quotes and to calculate the value per ton by the unit value system prior to placing an order.

The composition and the retail price per ton (within reasonable limits) are in the hands of the manufacturers and importers; it will therefore be readily understood that it is they who actually control unit values.

The commercial value per ton of any given fertilizer may be obtained by multiplying the percentage of each fertilizing ingredient by its respective unit value.

In the case of—

Sulphate of Ammonia.

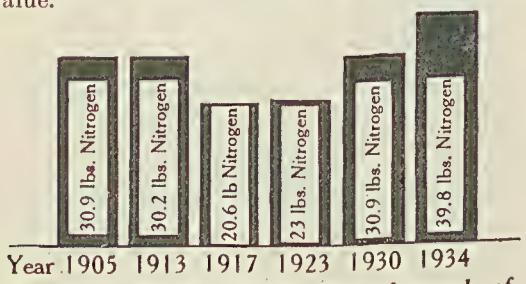
	Per cent.	Unit Value.	
Nitrogen as ammonia,	20.6	x 12s.	=£12 7s. 3d.
Calculated value per ton			=£12 7s. 3d.
Price asked per ton (av.)			=£12 6s. 3d.

As would be expected in the case of this simple fertilizer the average price asked is approximately equal to the calculated value.

Bone Dust.

The Fertilizers Act requires that the mechanical condition of a bonedust shall be guaranteed, together with the percentages of nitrogen and phosphoric acid; in addition, bonedust is defined as a fertilizer consisting only of disintegrated bones and containing at least 19 per cent. of phosphoric acid. The fine bone must comprise 50 per cent. of the whole.

Let us consider a case where two bonedusts are under offer. Brand A at £7 15s. per ton is guaranteed to contain 4 per cent. of nitrogen and 19 per cent. of phosphoric acid, whereas Brand B is labelled 3.5 per cent. nitrogen and 23.5 per cent. phosphoric acid, and the price asked per ton is £9. Both fertilizers have the same degree of fineness, namely, 50 per cent. fine bone. The question is, which brand of bonedust will give the best value.



Graph 2.—Showing the number of pounds of nitrogen received for every 20s. expended on sulphate of ammonia during the period 1905-34.

A glance at the list of unit values published in the following pages will show that separate values are given for phosphoric acid and nitrogen as fine bone and coarse bone respectively. The commercial reason for the difference in value is that the finer the degree of division the higher the cost of manufacture. For agricultural purposes the finer the bonedust the greater the availability of the nitrogen and phosphoric acid.

To calculate the values of the two brands of bonedust quoted, viz., A and B, it is necessary in the first place to compute the percentages of phosphoric acid and nitrogen present as fine bone and coarse bone. To do this, multiply the percentage of the fertilizing ingredient by the percentage of fine bone, and divide by 100. This calculation will give the percentage as fine bone, which, when subtracted from the total, will leave the percentage of coarse bone.

Therefore, to calculate the commercial value of the two bonedusts (A and B) which are under offer, we proceed as follows:—

Brand A containing 4 per cent. nitrogen and 19 per cent. phosphoric acid with 50 per cent. fine bone.

Then 4 per cent. nitrogen x 50 (the percentage of fine bone) divided by 100 equals 2 *per cent. of nitrogen as fine bone,* and this subtracted from the total nitrogen, viz., 4 per cent., leaves 2 *per cent. nitrogen as coarse bone.*

Similarly 19 per cent. of phosphoric acid x 50 (the percentage of fine bone) divided by 100 equals 9.5 *per cent. of phosphoric acid as fine bone,* and this figure subtracted from 19, which is the percentage of total phosphoric acid, leaves 9.5 *per cent. of phosphoric acid as coarse bone.*

Using the same method with Brand B we get—3.5 per cent. nitrogen x 50, and divided by 100 equals 1.75 *per cent. nitrogen as fine bone,* and subtracting this from 3.5 the figure remaining, viz., 1.75 *is the percentage of nitrogen as coarse bone.*

The calculation for phosphoric acid will give 11.75 *per cent. as fine bone* and 11.75 *per cent. as coarse bone,* and finally as shown in the table below.

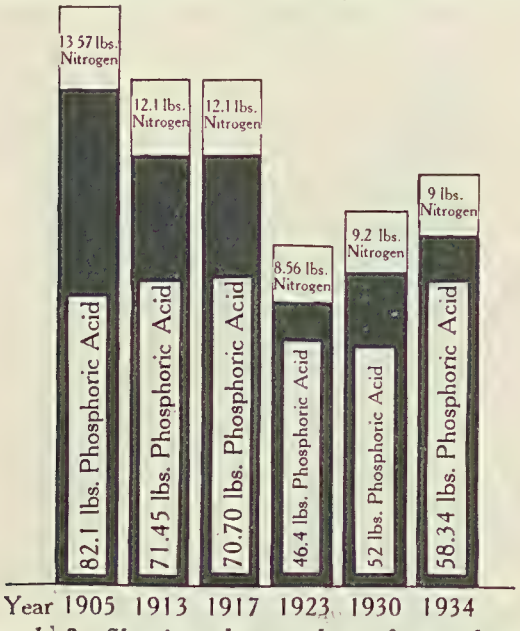
The calculated values show Brand A to be the better proposition in that it is worth *six shillings and fourpence in excess of the price asked per ton,* whereas the calculation for Brand B *shows a deficit of four shillings and tenpence per ton in commercial value.*

By this comparison, Brand A at £7 15s. per ton is worth 11s. 2d. more than Brand B at £9 per ton.

However, before making a final decision to purchase it is necessary to make allowance

	Brand A.				Brand B.			
	Per Cent.	Unit Value.			Per Cent.	Unit Value.		
		s. d.	£ s. d.			s. d.	£ s. d.	
Nitrogen as fine bone	2	x 17 7	= 1 15 2		1·75	x 17 7	= 1 10 9	
Nitrogen as coarse bone	2	x 15 7	= 1 11 2		1·75	x 15 7	= 1 7 0	
Phosphoric acid as fine bone	9·5	x 5 6	= 2 12 3		11·75	x 5 6	= 3 4 7	
Phosphoric acid as coarse bone	9·5	x 4 6	= 2 2 9		11·75	x 4 6	= 2 12 10	
Calculated value per ton			8 1 4				8 15 2	
Price asked per ton			7 15 0				9 0 0	

for any difference in freight charges. It is possible for the increased freight charge on a fertilizer manufactured in a country centre to more than balance any difference in value when compared with a similar line which is manufactured in the metropolis, and vice versa.



Graph 3.—Showing the number of pounds of nitrogen and phosphoric acid received for every 20s. expended on bone-dust during the period 1905-34.

Complete Fertilizer.

The unit value method when applied to a complete fertilizer should present little difficulty, although it may be regarded as a much longer sum.

The example shown in the table below will serve to illustrate.

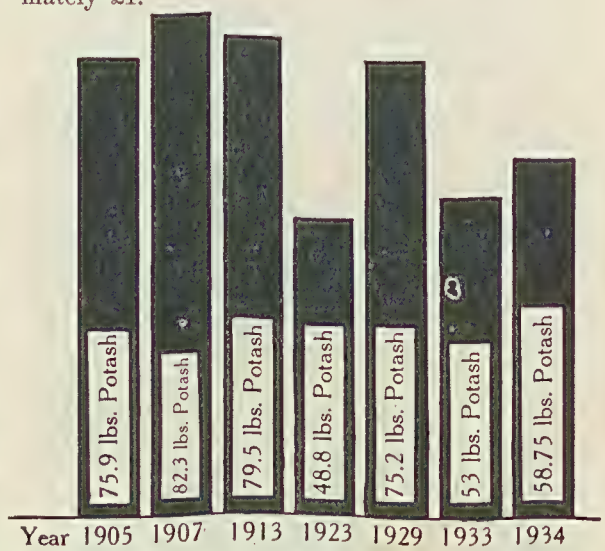
At first glance it would appear from the figures that too much is being charged for this fertilizer. It must be borne in mind, however, that in the case of mixed fertilizers consisting of a blend of several fertilizers, the cost of thoroughly incorporating the potash, nitrogen, and phosphoric acid compounds to produce a homogeneous mixture must be taken into consideration.

Unit Values for Past and Present Seasons.

It is interesting to note that unit values for the current year show a tendency to ease, the single exception being nitrogen in the form of sulphate of ammonia.

The price of this fertilizer has shown a marked advance in London since January, 1933. As Australia has to import a quantity from abroad to supply the demand, the advance in the local price was not unexpected.

Whereas the increase in the London price is £1 10s. per ton when compared with last year, the advance in the local price is approximately £1.

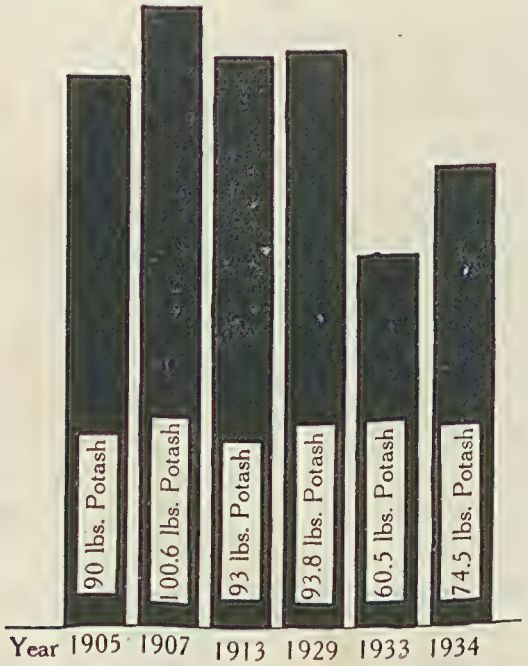


Graph 4.—Showing the number of pounds of potash received for every 20s. expended on sulphate of potash during the period 1905-34.

	Per Cent.	Unit Value.					
			s.	d.	£	s.	d.
Nitrogen as ammonia	1·00	x	12	0	= 0	12	0
Nitrogen as blood	1·00	x	17	7	= 0	17	7
Phosphoric acid as water soluble	14·85	x	4	2	= 3	1	10
Phosphoric acid as citrate soluble	0·36	x	3	6	= 0	1	2
Phosphoric acid as citrate insoluble	0·72	x	2	2	= 0	1	7
Potash as sulphate	4·85	x	7	8	= 1	17	3
Calculated value per ton					6	11	5
Price asked per ton					8	2	6

The following table compares the unit values for the two years 1933 and 1934:—

—	Unit Value.		Approximate Percentage.	
	1933.	1934.	Increase.	Decrease.
Nitrogen organic—	s. d.	s. d.	%	%
As blood, fine bone, &c. ..	18 6	17 7	..	5
As nitrate ..	21 3	17 7	..	17
As coarse bone ..	16 6	15 7	..	5½
As ammonia ..	11 3	12 0	6½	..
Phosphoric acid—				
As water soluble	4 6	4 2	..	7½
As citrate solubl in blood and bone, &c. ..	4 6	4 6	..	..
As citrate insoluble in blood and bone, &c.	4 0	4 0	..	..
In fine bone ..	5 8	5 6	..	3
In coarse bone ..	4 8	4 6	..	4
In ground phosphate ..	2 4	2 2	..	7
Potash—				
As sulphate ..	8 6	7 8	..	10
As chloride ..	7 0	6 0	..	14



Graph 5.—Showing the number of pounds of potash received for every 20s. expended on chloride of potash during the period 1905-34.

In recent years certain imported synthetic fertilizers have been placed on the Victorian market. Although the prices quoted per ton were most favorable, the fertilizers have not proved popular. As a matter of fact, the tonnage imported was insignificant, and this year the fertilizers have been withdrawn from the market.

Fertilizers which appear on the markets abroad but have disappeared from the Victorian market since the Great War are basic slag and kainit. The former, which was sold under the names of Thomas' Star or Basic Phosphate, is a heavy dark powder, a by-product of the Bessemer process in the steel industry, and, when available, was in fair demand in various parts of the State for use on the heavier types of soils.

It contains phosphatic compounds, equal to approximately 17 per cent. of phosphoric acid, of which 14 per cent. was in the citrate soluble form, associated with soluble silica, iron, magnesia, and lime, and is distinctly basic in character. The basic phosphate, which is sold in Victoria, is really a basic superphosphate, and is an entirely different product to the imported basic phosphate (slag).

It is rather remarkable to observe that this fertilizer containing the same percentage of phosphoric acid is valued 1s. 6d. per ton higher in England than superphosphate—the latter, however, is a much lower grade than the superphosphate placed on the Victorian market. The percentage of available phosphate is the same in both fertilizers.

Kainit is a low-grade potash (14 per cent.) fertilizer, and when on the market in Victoria was known as "cheap potash." The potash in the fertilizer is mainly in the form of chloride, and is associated with appreciable amounts of common salt and magnesium sulphate (Epsom salts). It is particularly useful in floriculture and market gardens (particularly for the culture of bulbs, shrubs, asparagus, &c.).

When this fertilizer was available orchardists were inclined to favour it, but the element of cheapness may have had something to do with the favoritism.

In the following table a comparison is given of the prices of the principal fertillzers at home and in London:—

Fertilizer.	London Price per Ton.	Victorian Price per Ton.
	£ s. d.	£ s. d.
Nitrate of soda	7 8 6	13 10 0
Sulphate of ammonia ..	6 15 0	12 6 3
Superphosphate	3 17 0	4 7 6
Muriate of potash ..	10 5 0	15 10 0
Sulphate of potash ..	12 3 6	18 10 0

In the case of superphosphate, the English fertilizer is low grade, and the price quoted has been re-calculated according to the unit value system to equal high-grade superphosphate, which is marketed in Victoria.

Fertilizers Act 1928 (No. 3680).

LIST OF UNIT VALUES FOR THE YEAR 1934.

	Unit Value. £ s. d.
Nitrogen, organic, as Blood; Blood and Bone; Blood, Bone, and Flesh; and Fine Bone	0 17 7
,, as Nitrate	0 17 7
,, as Coarse Bone and in Bone Fertilizers	0 15 7
,, as Ammonia	0 12 0
Phosphoric Acid—	
as Water Soluble	0 4 2
as Citrate Soluble—	
in Blood and Bone, in Animal Fertilizers, and in Mixed and Complete Fertilizers containing either or both of the foregoing	0 4 6
in all other Fertilizers	0 3 6
as Citrate Insoluble—	
in Blood and Bone, in Animal Fertilizers, and in Mixed and Complete Fertilizers containing either or both of the foregoing	0 4 0
in other Mixed Fertilizers and in Ground Phosphate	0 2 2
in other Fertilizers	0 1 0
as Fine Bone	0 5 6
as Coarse Bone	0 4 6
Potash, as Sulphate	0 7 8
,, as Chloride	0 6 0

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1934.

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.*	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Nitrogenous — Readily Soluble.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Nitrate of Soda	Sickle in diamond	15·50	..	..	..	..	15·50	..	..	..	..	..	13 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William st., Melb.
,, ,,	Cresco ..	15·00	..	..	..	..	15·00	..	..	..	..	..	13 10 0	Cresco Fertilizers Ltd., Geelong
,, ,,	Pivot ..	15·50	..	..	..	..	15·50	..	..	..	..	..	13 10 0	The Phosphate Co-operative Co. of Aust., Ltd., 447 Little Collins-st., Melb.
Sulphate of Ammonia	M.G. Co. in diamond	..	20·59	..	..	..	20·59	..	..	..	..	..	12 2 4	Metropolitan Gas Co., Flinders-st., Melb.
,, ,,	Cresco ..	..	20·00	..	..	..	20·00	..	..	..	..	..	12 7 6	Cresco Fertilizers Ltd., Geelong
,, ,,	Sickle in diamond	..	20·60	..	..	..	20·60	..	..	..	..	..	12 7 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
,, ,,	Pivot ..	..	20·60	..	..	..	20·60	..	..	..	..	..	12 7 6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melb.
Moderately Soluble.														
Dried Blood ..	Pannifex ..	..	..	12·00	..	..	12·00	..	..	·50	·50	1·10	11 0 0	H. C. Pannifex and Co., 149-153 Stanley-st., West Melb.
,, ,, ..	T.B. and S. in diamond Brooklyn	..	..	11·60	..	..	11·60	..	..	..	..	..	9 10 0	Thos. Borthwick and Sons (A/asia) Ltd., 84 William-st., Melb.
,, ,, ..	M.C.C. in diamond	..	..	11·50	..	..	11·50	..	..	..	..	..	9 10 0	Melbourne City Abattoirs, Smithfield-rd., Flemington
,, ,, ..	Imperial ..	..	..	11·75	..	..	11·75	..	..	·75	·75	·50	9 10 0	W. Angliss and Co. (Aust.) Pty. Ltd, 42 Bourke-st., Melbourne.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3080) FOR THE YEAR 1934—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.*	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Nitrogenous—Moderately Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d	
Blood Manure ..	Cockbill's ..	..	..	8·50	..	..	8·50	..	..	1·00	1·00	..	8 10 0	W. and J. Cockbill, trading as J. Cockbill, 407 Post Office-place, Melb.
„ „ ..	M.C.C. in diamond	..	..	8·00	..	..	8·00	..	..	..	..	..	6 15 0	Melbourne City Abattoirs, Smithfield-rd., Flemington
„ „ ..	Nifex ..	..	..	7·50	..	..	7·50	..	..	1·00	1·00	·25	7 15 0	H. C. Pannifex and Co., 149-153 Stanley-st. West Melb.
„ „ ..	Sickle in diamond	..	..	7·50	..	..	7·50	..	..	..	..	..	8 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
Slowly Soluble. Castor Meal ..	Alba ..	..	..	..	..	..	5·00 (as castor meal)	..	..	2·25	2·25	·75	3 15 0	Lycett Pty. Ltd., Normanby-rd., Montague
Phosphatic—Readily Soluble. Superphosphate 22 per cent.	Lamaco ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	4 7 6	New Zealand Loan and Mercantile Agency Co. Ltd., 538 Collins-st., Melb.
„ „	Cockbills ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	4 7 6	W. and J. Cockbill, trading as J. Cockbill, 407 Post Office place, Melb.
„ „	Cresco ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	4 7 6	Cresco Fertilizers Ltd., Geelong
„ „	Sickle in diamond	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	4 7 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Pivot ..	..	..	..	..	..	..	20·50	·50	1·00	22·00	..	4 7 6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melb.
Moderately Soluble. Basic Phosphate	Sickle in diamond	..	..	..	..	..	..	..	15·50	3·20	18·70	..	4 15 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Pivot ..	..	..	..	..	..	..	..	15·50	3·00	18·50	..	4 15 0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melb.
Super. and Rock Phosphate	Pivot ..	..	..	..	..	..	..	10·00	·50	18·50	29·00	..	4 10 0	„ „ „ „
„ „	Sickle in diamond	..	..	..	..	..	..	10·00	·50	18·50	29·00	..	4 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Sickle in diamond, No. 2	..	..	..	..	..	..	13·33	·50	12·67	26·50	..	4 15 0	„ „ „ „
„ „	Cresco 50/50 ..	..	..	..	..	..	..	9·16	1·84	17·40	28·40	..	4 10 0	Cresco Fertilizers Ltd., Geelong
Slowly Soluble. Ground Phosphate	Sickle in diamond (80%)	..	..	..	..	..	..	..	..	36·65	36·65	..	4 0 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Pivot ..	..	..	..	..	..	..	..	..	36·50	36·50	..	3 15 0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melb.
„ „	Pivot, very fine	..	..	..	..	..	..	..	..	36·50	36·50	..	4 0 0	„ „ „ „
Potassic—Readily Soluble. Muriate of Potash	Sickle in diamond (80%)	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	15 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Cresco ..	..	..	..	..	..	..	..	..	..	..	50·00 (as chloride)	15 10 0	Cresco Fertilizers Ltd., Geelong
„ „	Cresco, 30% Potash Manure Salt	..	..	..	..	..	..	..	..	..	..	30·00 (as chloride)	8 0 0	„ „ „ „

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1934—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.*	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble	As Citrate Insoluble.	Total.			
Potassic—Readily Soluble — continued.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Sulphate of Potash	Cresco ..	..	..	..	..	..	..	..	..	..	..	48·50	18 10 0	Cresco Fertilizers Ltd., Geelong
„ „	Sickle in diamond (90%)	..	..	..	..	..	..	..	..	..	..	48·50	18 10 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Pivot ..	..	..	..	..	..	..	..	..	..	..	48·50	18 10 0	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melb.
Containing Nitrogen and Phosphoric Acid. Readily Soluble.														
Super. and Ammonia	Sickle in diamond (6 : 1)	..	2·94	..	..	..	2·94	17·57	·43	·85	18·85	..	5 17 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Sickle in diamond (3 : 1)	..	5·15	..	..	..	5·15	15·37	·37	·76	16·50	..	6 15 0	„ „ „ „
„ „	Sickle in diamond (2 : 1)	..	6·87	..	..	..	6·87	13·66	·34	·66	14·66	..	7 10 0	„ „ „ „
„ „	Sickle in diamond (1 : 1)	..	10·30	..	..	..	10·30	10·25	·25	·50	11·00	..	8 17 6	„ „ „ „
„ „	Cresco (6 and 1)	..	2·85	..	..	..	2·85	17·48	·42	·85	18·75	..	5 17 6	Cresco Fertilizers Ltd., Geelong
„ „	Cresco (3 and 1)	..	5·00	..	..	..	5·00	15·37	..	1·13	16·50	..	6 15 0	„ „ „ „
„ „	Cresco (2 and 1)	..	6·87	..	..	..	6·87	13·66	·34	·66	14·66	..	7 10 0	„ „ „ „
„ „	Cresco (1 and 1)	..	10·30	..	..	..	10·30	10·25	·25	·50	11·00	..	8 17 6	„ „ „ „
„ „	Pivot I. ..	..	2·90	..	..	..	2·90	17·40	·40	·80	18·60	..	5 17 6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melb.
„ „	Pivot II. ..	..	5·00	..	..	..	5·00	15·30	·30	·80	16·40	..	6 15 0	„ „ „ „
„ „	Pivot II. (*a*) ..	..	6·80	..	..	..	6·80	13·60	·30	·60	14·60	..	7 10 0	„ „ „ „
„ „	Pivot III. ..	..	10·00	..	..	..	10·00	10·20	·20	·50	10·90	..	8 17 6	„ „ „ „
Nitro - Superphosphate	Sickle in diamond	..	1·50	..	..	·50	2·00	16·69	1·12	2·01	19·82	..	6 12 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Cresco ..	..	1·50	..	·50	..	2·00	16·39	1·10	1·70	19·19	..	6 12 6	Cresco Fertilizers Ltd., Geelong
Moderately Soluble.														
Ammonia and Rock Phosphate	Cresco ..	..	2·00	..	..	..	2·00	8·30	1·60	15·70	25·60	..	5 12 6	„ „ „ „
Blood, Bone and Super.	Cockbill's ..	..	..	..	2·50	..	2·50	12·51	1·43	2·96	16·90	..	7 10 0	W. and J. Cockbill, trading as J. Cockbill, 407 Post Office-place, Melb.
„ „	Sickle in diamond	..	..	..	..	2·50	2·50	12·51	1·43	2·96	16·90	..	7 2 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
Bone and Super.	Sickle in diamond, No. 1	..	..	..	..	2·00	2·00	11·38	3·08	5·32	19·78	..	6 17 6	„ „ „ „
„ „	J. A. Dundas	..	..	..	..	2·25	2·25	9·99	5·16	5·58	20·73	..	8 0 0	J. A Dundas, Dynon-rd., Footscray
„ „	Cresco ..	..	..	..	2·00	..	2·00	9·50	3·90	3·00	16·40	..	6 17 6	Cresco Fertilizers Ltd., Geelong
Bone Fertilizer and Super.	Rohs in circle..	..	..	..	..	..	1·50 (as bone)	9·50	2·00	4·50	16·00	..	7 10 0	P. Rohs Pty. Ltd., Bridge-st., Bendigo
„ „	Elsworth's ..	..	..	..	..	..	1·50 (as bone)	11·00	2·50	5·00	18·50	..	6 15 0	W. R. Elsworth, York-st., Ballarat
„ „	King's, Geelong	..	..	..	..	1·60	1·60	6·15	5·50	3·85	15·50	..	6 15 0	Joseph C. King and Sons Pty. Ltd., King's-av., Marshall
Super. and Bone	Sickle in diamond, No. 2	..	..	..	..	1·00	1·00	15·95	1·79	3·16	20·90	..	6 0 0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
„ „	Cresco ..	..	..	..	..	1·00	1·00	16·10	1·10	3·60	20·80	..	6 0 0	Cresco Fertilizers Ltd., Geelong
Blood and Bone	J. A. Dundas	..	..	..	..	4·50	4·50	..	7·14	13·61	20·75	..	8 0 0	J. A. Dundas, Dynon-rd., Footscray
„ „	Apollo ..	..	..	..	5·00	..	5·00	..	4·00	12·00	16·00	..	8 10 0	J. Kitchen and Sons Pty. Ltd., Ingles-st., Port Melb.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1934—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.*			Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone, and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.					
Containing Nitrogen and Phosphoric Acid—Moderately Soluble—continued.		%	%	%	%	%	%	%	%	%	%	%	£	*s.*	*d.*	
Blood and Bone	T.B. and S in. diamond—Lighthouse	..	..	..	6·00	..	6·00	..	5·00	2·00	7·00	..	7	10	0	Thos. Borthwick and Sons (A/asia) Ltd., 84 William-st., Melb.
,, ,,	T.B. and S. in diamond—Brooklyn	..	..	..	6·00	..	6·00	..	9·00	4·00	13·00	..	7	10	0	,, ,, ,, ,,
,, ,,	Corio ..	..	..	..	4·00	..	4·00	..	6·00	8·00	14·00	..	6	8	0	The Corio Trading Co. Pty. Ltd., 164 Moorabool-st., Geelong
,, ,,	Rohs in circle..	..	..	..	6·00	..	6·00	..	8·00	5·00	13·00	..	8	15	0	P. Rohs Pty. Ltd., Bridge-st., Bendigo
,, ,,	Pridham's ..	..	..	..	7·00	..	7·00	..	6·60	3·40	10·00	..	6	10	0	W. Pridham Pty. Ltd., Evans-st., Braybrook
,, ,,	C.K. ..	..	..	..	4·65	..	4·65	..	6·97	10·25	17·22	..	7	0	0	A. Reid, Elliminyt
,, ,,	Fitzgerald's ..	..	..	..	5·10	..	5·10	..	9·75	4·40	14·15	..	7	0	0	P. Fitzgerald and Sons, Warrigal-rd., Oakleigh
,, ,,	Cockbill's ..	..	..	..	..	5·25	5·25	..	3·00	9·00	12·00	..	8	10	0	W. and J. Cockbill, trading as J. Cockbill, 407 Post Office-place, Melb.
,, ,,	W. and M. in circle	..	..	..	6·00	..	6·00	..	4·50	5·50	10·00	..	8	10	0	Western and Murray Co-op. Bacon Co. Ltd., 522 Flinders-lane, Melb.
,, ,,	Arch No. 1 ..	..	..	..	7·00	..	7·00	..	7·00	3·00	10·00	..	8	0	0	Amalgamated Freezing Co. (Vic.) Pty. Ltd., 54 Market-st., Melb.
,, ,,	Arch No. 2 ..	..	..	..	8·00	..	8·00	..	4·50	2·50	7·00	..	8	0	0	,, ,, ,, ,,
,, ,,	Arch No. 3 ..	..	..	..	7·50	..	7·50	..	6·75	3·25	10·00	..	8	0	0	,, ,, ,, ,,
,, ,,	Pannifex's No. 1	..	..	..	..	6.35	6·35	..	5·00	6·50	11·50	..	8	15	0	H. C. Pannifex and Co., 149–153 Stanley-st., West Melb.
,, ,,	Pannifex's No. 2	..	..	..	..	7·17	7·17	..	5·00	6·99	11·99	..	9	0	0	,, ,, ,, ,,
,, ,,	Pannifex's No. 5	..	..	..	..	8·00	8·00	..	3·00	5·00	8·00	..	8	10	0	,, ,, ,, ,,
,, ,,	Pannifex's Oak	..	..	..	..	6·90	6·90	..	4·00	5·50	9·50	..	8	10	0	,, ,, ,, ,,
,, ,,	Cresco ..	..	..	..	..	5·00	5·00	..	3·00	11·50	14·50	..	8	0	0	Cresco Fertilizers Ltd., Geelong
,, ,,	Sickle in diamond	..	..	..	..	5·00	5·00	..	6·00	10·00	16·00	..	8	0	0	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
,, ,,	Clover ..	..	..	..	4·31	..	4·31	..	8·68	9·44	18·12	..	7	0	0	H. T. Impey, 139 Barkley-st., Ararat
,, ,,	Imperial ..	..	..	..	5·00	..	5·00	..	5·00	10·00	15·00	..	6	10	0	W. Angliss and Co. (Aust.) Pty. Ltd., 42 Bourke-st., Melbourne
Animal Fertilizer	Pannifex's No. 2	..	..	..	..	4·50	4·50	..	5·00	12·00	17·00	..	7	15	0	H. C. Pannifex and Co., 149–153 Stanley-st., West Melb.
,, ,,	Pannifex's No. 3	..	..	..	..	5·50	5·50	..	5·00	10·00	15·00	..	8	0	0	,, ,, ,, ,,
,, ,,	Pannifex's No. 4	..	..	..	..	6·00	6·00	..	5·00	7·00	12·00	..	8	15	0	,, ,, ,, ,,
,, ,,	Pannifex's No. 5	..	..	..	..	3·00	3·00	..	5·00	12·00	17·00	..	7	0	0	,, ,, ,, ,,
,, ,,	Fertbone ..	..	..	..	..	5·00	5·00	..	4·00	8·00	12·00	..	7	10	0	,, ,, ,, ,,
,, ,,	Ibis	.	..	..	..	4·00	4·00	..	8·00	8·50	16·50	..	6	12	6	Ficken, Halliday, and McLelland Pty. Ltd., Raleigh-st., Braybrook
,, ,,	A.N.A. Surprise	.	..	..	..	5·00	5·00	..	4·00	10·00	14·00	..	7	10	0	G. W. Pennell, Burke-st., Braybrook
,, ,,	Fitzgerald's ..	..	..	..	..	3·50	3·50	..	11·25	7·75	18·00	..	7	0	0	P. Fitzgerald and Sons, Warrigal-rd., Oakleigh
Bone Fertilizer	Pannifex's ..	..	..	..	..	..	4·00 (as bone)	·50	5·80	11·70	18·00	..	6	15	0	H. C. Pannifex and Co., 149–153 Stanley-st., West Melb.
,, ,,	Echuca ..	..	..	..	4·25	..	4·25	..	8·25	8·50	16·75	..	8	0	0	W. G. Boyle Pty. Ltd., Echuca
,, ,,	Elsworth's ..	..	..	..	..	..	4·00 (as bone)	·50	5·80	11·70	18·00	..	7	5	0	W. R. Elsworth, York-st., Ballarat
,, ,,	King's, Geelong	..	..	..	..	3·00	3·00	..	7·86	2·87	10·73	..	6	5	0	Joseph C. King and Sons, Pty. Ltd., King's-av., Marshall
Mixed Manure ..	Humo-Phos. ..	..	1·28	1·03 (as organic)	..	..	2·31	..	..	5·46	5·46	..	4	5	0	Peninsula Lime and Fertilizer Co. Pty. Ltd., 70 Elizabeth-st., Melb.

LIST OF FERTILIZERS REGISTERED AT THE OFFICE OF THE DIRECTOR OF AGRICULTURE UNDER THE FERTILIZERS ACT 1928 (No. 3680) FOR THE YEAR 1934—*continued.*

Description of Fertilizer.	Brand.	Nitrogen.						Phosphoric Acid.				Potash as Sulphate.	Price asked per ton.	Where Obtainable.
		As Nitrate.	As Ammonia.	As Blood.	As Blood and Bone.	As Blood, Bone and Flesh.	Total.	As Water Soluble.	As Citrate Soluble.	As Citrate Insoluble.	Total.			
Containing Nitrogen, Phosphoric Acid and Potash.		%	%	%	%	%	%	%	%	%	%	%	£ s. d.	
Market Garden Manure	Cresco ..	·	1·50	..	1·56	..	3·06	11·65	1·49	3·26	16·40	2·42	8 2 6	Cresco Fertilizers Ltd., Geelong
,, ,,	Sickle in diamond	..	1·72	..	..	1·56	3·28	10·26	2·43	4·23	16·92	2·42	8 2 6	Commonwealth Fertilizers and Chemicals Ltd., 65 William-st., Melb.
Complete Manure	Sickle in diamond, No. 1	..	1·00	..	..	1·40	2·40	10·94	2·22	3·86	17·02	5·00 (as chloride)	9 0 0	,, ,, ,, ,,
,, ,,	Sickle in diamond, No. 2	..	1·00	1·00	..	..	2·00	14·85	·36	·72	15·93	4·85	8 2 6	,, ,, ,, ,,
,, ,,	Sickle in diamond (A6.1.1)	..	2·57	..	..	..	2·57	15·37	·38	·75	16·50	6·06	7 15 0	,, ,, ,, ,,
,, ,,	Sickle in diamond (B5.2.1)	..	5·15	..	..	..	5·15	12·81	·31	·63	13·75	6·06	9 0 0	,, ,, ,, ,,
,, ,,	Sickle in diamond (C4.4.1)	..	9·15	..	..	..	9·15	9·11	·22	·44	9·77	5·39	9 17 6	,, ,, ,, ,,
,, ,,	Sickle in diamond (D2.2.1)	..	8·24	..	..	..	8·24	8·20	·20	·40	8·80	10·00 (as chloride)	10 17 6	,, ,, ,, ,,
,, ,,	Pivot IV. ..	..	2·90	..	..	..	2·90	14·30	·30	·70	15·30	6·90	7 17 6	The Phosphate Co-operative Co. of Aust. Ltd., 447 Little Collins-st., Melb.
,, ,,	Pivot V. ..	..	8·20	..	..	..	8·20	8·20	·20	·40	8·80	9·60	10 17 6	,, ,, ,, ,,
,, ,,	Pivot VI. ..	..	9·10	..	..	..	9·10	9·10	·20	·40	9·70	5·30	9 17 6	,, ,, ,, ,,
Mixed Manure	Cresco No. 2 ..	..	1·00	..	1·40	..	2·40	11·25	2·00	4·50	17·75	5·00	9 0 0	Cresco Fertilizers Ltd., Geelong
,, ,,	Cresco No. 3 ..	..	9 15	..	..	..	9·15	9·11	·22	·44	9·77	5·39	9 17 6	,, ,, ,, ,,
,, ,,	Cresco No. 4 ..	..	2·57	..	..	..	2·57	15·37	·38	·75	16·50	6·06	7 15 0	,, ,, ,, ,,

Description of Fertilizer.	Brand.	Nitrogen.	Phosphoric Acid.	Mechanical Condition.		Price asked per ton.*	Where obtainable.
				Fine Bone.	Coarse Bone.		
		%	%	%	%	£ s. d.	
Bonedust ..	Ox	3·26	23·60	53·8	46·2	7 10 0	Thos. Brown Successors, Gray-street, Hamilton
,, ..	Rohs in circle ..	4·00	19·00	50·0	50·0	7 15 0	P. Rohs Pty. Ltd., Bridge-street, Bendigo
,, ..	Gippsland Bone Products	3·25	25·00	56·0	43·0	8 10 0	Ronchi Bros., Raymond-street, Sale
,, ..	Pioneer ..	3·82	21·96	50·0	50·0	8 10 0	W. Rainey, Mepunga East, via Allansford
,, ..	Mount Clear ..	3·00	19·00	50·0	50·0	7 0 0	Bailey Bros., 6 Sturt-street, Ballarat
,, ..	Oak ..	2·00	24·00	70·0	30·0	10 0 0	H. C. Pannifex and Co., 149–153 Stanley-street, West Melbourne
,, ..	Pannifex's No. 2	4·00	19·00	50·0	50·0	9 0 0	,, ,, ,, ,,
,, ..	Nuelife ..	3·50	23·50	50·0	50·0	9 0 0	E. F. Peters and Sons Pty. Ltd., Dunolly

* F.O.R. at station nearest place of manufacture or, when imported, Melbourne.

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The Shell Company Ltd. is in possession of advice from stock-owners in all States who testify to the excellence of Shell Defiance Blowfly Oil as a valuable, non-poisonous healing preparation for stock wounds.

Remarkably quick cures, with complete freedom from the aggravating attention of blowflies, have been effected with this specific, and these include shear cuts, dog bites and barbed-wire wounds in sheep; castration wounds in pigs; sore mouths of cattle caused by eating thistles; and sore shoulders on horses.

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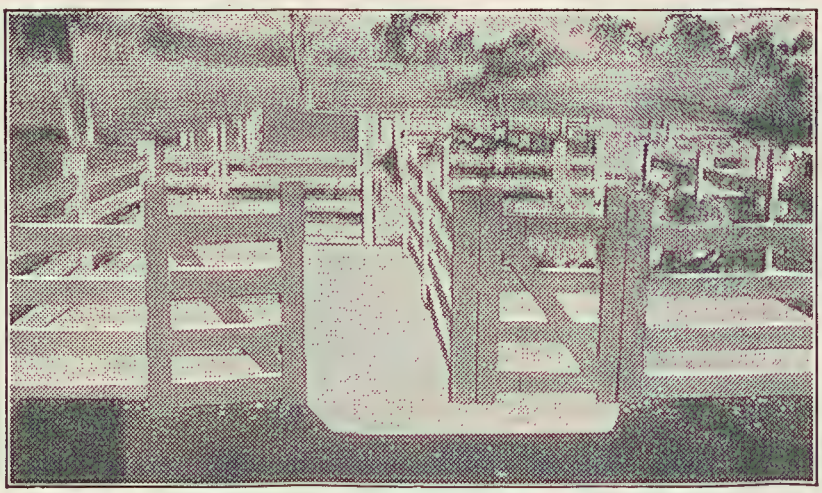

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Electric motor power totals 1,000 h.p.

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at the State Research Farm, Werribee

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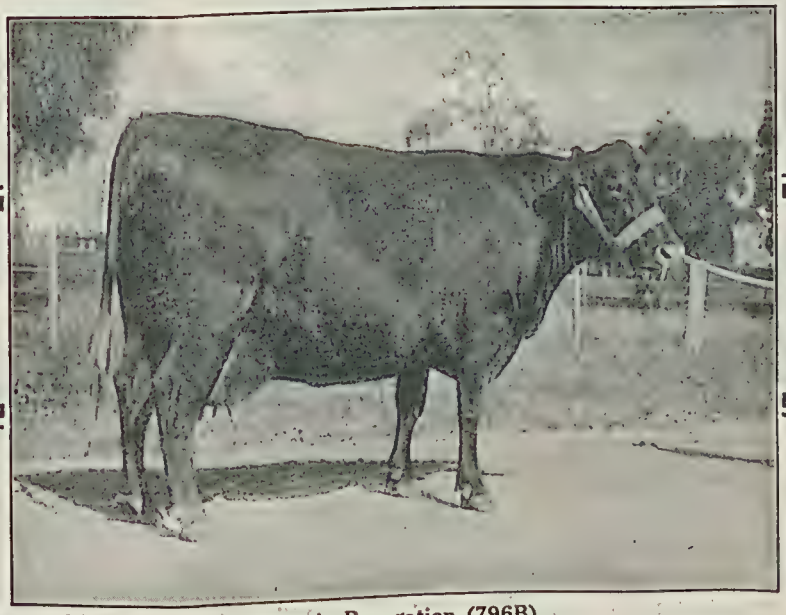
MEAT



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Victoria Reparation (796B)
540 lb. butter fat in 273 days. 2nd Prize 1929, and 3rd Prize 1928 in Weekly Times Champion Milk and Butter Fat Test at Melbourne Royal Show against all breeds.

372 Females have already been sold to breeders in all States of Australia and New Zealand

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Herd Average over last 6 years in Standard Herd Test—
7,692 lb. milk, 4.41 test, 338 lb. butter fat, 417 lb. butter fat with allowances for heifers.
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The publication contains 80 pages of reading matter and many photographs.

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THE VICTORIA FRIESIAN STUD

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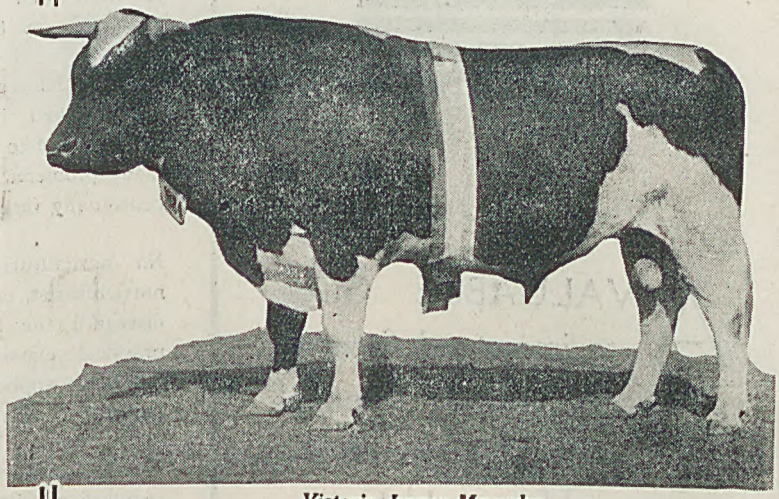
Herd Sire

VICTORIA JOYOUS MERCEDES (985):

Champion, Melbourne Royal Show 1931 and 1933,

Reserve Champion 1928 and 1929.



Victoria Joyous Mercedes.

Dam:
Victoria Joybell, produced 15,387 lb. milk, 3.67 % test, 565 lb. butter fat in 273 days, twice-a-day milking.

Daughters:
His seven (7) first-calf daughters have averaged 9,895 lb. milk, 3.72 % test, 367 lb. butter fat in 273 days.

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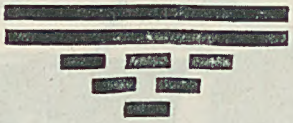

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One that will keep well and be appreciated by your guests is

A PLAIN FRUIT CAKE

Make One To-day

Here is a Good Tested Recipe

Plain Fruit Cake.

6 oz. butter
6 oz. sugar
3 eggs and a little milk
6 oz. plain flour
6 oz. self-raising flour
6 oz. sultanas
6 oz. currants

Cream butter and sugar, add eggs one at a time, and beat in well; add milk with a few drops of essence of vanilla or almond. Mix fruit through the sifted flour, and then add gradually to the butter mixture. Put in a greased tin, lined with paper, and bake in a moderate oven (375°) for 1½ hours. Half a nutmeg grated or a teaspoon of cinnamon may be used as a change from the essence.

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Christmas Puddings & Cakes.

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Do not delay in securing your supplies of **Currants, Sultanas,** and **Raisins.**

Make your Pudding To-day!

6 oz. flour.
6 oz. breadcrumbs.
8 oz. suet (beef).
8 oz. sultanas.
8 oz. currants.
8 oz. raisins.
2 oz. almonds.
6 eggs.

Here is a Good Tested Recipe!

6 oz. brown sugar.
¼ lb. mixed peel.
½ packet spice.
1 teaspoon salt.
½ teaspoon cinnamon.
Grated rind and juice of 1 lemon.
1 grated carrot.

Shred suet and rub it into the flour, add breadcrumbs and fruits properly prepared and cleaned. Add spice, sugar, grated lemon rind and grated carrot. Beat eggs and pour into dry ingredients, add lemon juice, and mix well. Cook in floured cloth or greased basin for 4 hours. Lift out, hang in a cool place until required (will keep for 6 weeks). Then boil another 2 hours and serve hot with sauce.

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